ICRES2025: 10th International Conference on Robot Ethics and Standards

ISEP – IPP, Porto, Portugal
3-4 July 2025

Program Booklet

https://clawar.org/icres2025/

WELCOME TO ICRES2025

ICRES 2025 is the tenth edition of the annual International Conference series on Robot Ethics and Standards. The conference is organized by CLAWAR Association in collaboration with the Instituto Superior de Engenharia do Porto (ISEP), the School of Engineering of the Porto Polytechnic, Portugal, during 3 – 4 July 2025. Previous editions of the conference were held in Yokohama, Japan (2024), Utrecht, The Netherlands (2023), Seoul, South Korea (2022), New York, USA (2021), Taipei, Taiwan (2020), London, UK (2019), New York, USA (2018), Lisbon, Portugal (2017 & 2015).

The ICRES2025 conference organisers would like to thank members of the International Scientific Committee and National Organising Committee for their efforts in reviewing the submitted articles, and authors for addressing the comments and suggestions of the reviewers in their final submissions. We hope that participants will find the conference presentations and proceedings valuable for their research and development efforts in this rapidly growing area of robot ethics and standards and associated technologies.

Manuel F. Silva, M. Osman Tokhi and Maria. Isabel. A. Ferreira
ICRES2025 General Co-Chairs

Conference Organisers

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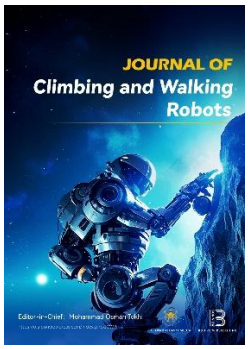

Journal of Climbing and Walking Robots
https://ojs.bonviewpress.com/index.php/JCWR

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Program Day-1: Thursday 3 July 2025

TIME (WEST)	EVENT
08:00 – 09:00	*Registration* *Room: Sala de Secretariado*
09:00 – 09:30	*Opening of ICRES2025* *Room: Sala de Atos*
09:30 – 10:30	**Plenary Presentation-1** Responsible Artificial Intelligence *Paulo Dimas* *Chair: Benedita Malheiro* *Room: Sala de Atos*
10:30 – 10:50	***Coffee Break*** *Room: Sala de Refeições*
10:50 – 11:50	**Plenary Presentation-2** Challenges of Using Robots and Autonomous Systems (RAS) in Warfare *General João Vieira Borges* *Chair: Osman Tokhi* *Room: Sala de Atos*
11:50 – 13:10	***Regulating AI-innovation in a Turbulent Geopolitical Era*** *Chair: Roeland de Bruin* *Room: Sala de Atos*
11:50 – 13:10	Special Session#6: Regulating AI-innovation in a Turbulent Geopolitical Era *Roeland de Bruin*
11:50 – 12:50	***Skills and Ethical Challenges in Industry: Towards a Human-Centred Approach to Workplace Design*** *Chair: Maryam Bathaei Javareshk, Iveta Eimontaite, Sarah Fletcher* *Room: F503*
11:50 – 12:10	#32: Assessing the Skills Gap for Industrial Operators in Industry 5.0 *Vaishnavi Sashidharan, Iveta Eimontaite, and Sarah Fletcher*
12:10 – 12:30	#36: Integrating Human-Centred Design in AI-based Automation in Manufacturing: Ethical challenges and findings from Participatory Design Operator Workshops *Maryam Bathaei Javareshk, Iveta Eimontaite, and Sarah Fletcher*
12:30 – 12:50	Ethics of robots and Autonomous Systems *Mohammad Osman Tokhi*
13:10 – 14:00	***Lunch Break*** *Room: Sala de Refeições*
14:00 – 15:20	***On the Ethics and Standards of Intelligent Systems – 1*** *Chair: Osman Tokhi* *Room: Sala de Atos*
14:00 – 14:20	#10: Ethical Chatbot Creation of Real People *Karen Lancaster*
14:20 – 14:40	#11: Towards Ethical Foundation Models in Robotics: Challenges and Proposals *Ergina Kavallieratou*
14:40 – 15:00	#18: Affordances and Barriers in AI Ethics: Rethinking AI Ethics Education for Developers. *Rosa Hyun Kyong Lee*
15:00 – 15:20	#26: Reflections on Autonomy: A Biologically-Motivated Approach *Isabel Ferreira*

15:20 – 15:40	***Coffee Break*** *Room: Sala de Refeições*
15:40 – 16:40	***The Future of Human Enhancement: Policy and Law for Cybernetic Avatars*** *Chair: Masahiro Sogabe* *Room: Sala de Atos*
15:40 – 16:00	#12: Human Rights in the Use of Enhancement Technologies *Yingjiao Zhu*
16:00 – 16:20	#16: The Societal Implementation of Cybernetic Avatars and Regulatory Challenges in Society 5.0 *Mayu Terada*
16:20 – 16:40	#17: Metaverse-Based Trials: Exploring the Legal Implications and Challenges *Jingying Pan*
17:00 – 23:30	**Porto Tour and Banquet** *Conference Banquet: Torreão Restaurante (https://www.torreao.pt/)*

Program Day-2: Friday 4 July 2025

TIME (WEST)	EVENT
08:00 – 09:00	*Registration* *Room: Sala de Secretariado*
09:00 – 10:00	**Plenary Presentation-3** Designing Robotic Partners in the Critical Relational Turn Beyond the Human *Emília Duarte* *Chair: Isabel Ferreira* *Room: Sala de Atos*
10:00 – 10:20	***Coffee Break*** *Room: Sala de Refeições*
10:20 – 12:20	***On the Ethics and Standards of Intelligent Systems – 2*** *Chair: Osman Tokhi* *Room: Sala de Atos*
10:20 – 10:40	#22: Ethical Risk Assessment for Collaborative Robots: Surfacing Potential Hazards and Risks in Assistive Robot Systems *Khairidine Benali, and Praminda Caleb-Solly*
10:40 – 11:00	#25: Should It Be Illegal To Mistreat Robots? Yes *Selmer Bringsjord*
11:00 – 11:20	#30: When Tools Are Co-Actors, Are They Still Tools? *Isabel Ferreira, and João Sequeira*
11:20 – 11:40	#37: Steps Towards Beneficial Intelligent Technologies *Isabel Ferreira, and João Sequeira*
11:40 – 12:00	#31: Mapping Ethics in EPS@ISEP Robotics Projects *Benedita Malheiro, Pedro Guedes, Manuel Silva, and Paulo Ferreira*
12:00 – 12:20	#34: Towards collective imagining of an open-sourced, living robotics lexicon *Matimba Swana, Kit Kuksenok and Suet Lee*
10:20 – 12:20	***Assertions in Ethics of Environmental Robotics*** *Chair: Avgi Stavrou, Matimba Swana, Ella Maule, Khulud Alharthi* *Room: F503*
10:20 – 12:20	Special Session #3: Assertions in Ethics of Environmental Robotics *Matimba Swana, Avgi Stavrou, Ella Maule, Helen McGloin, Khulud Alharthi, Jessica Woodgate, Richard Mawle, Kostas Karachalios, and Elena Dieckmann*
12:20 – 13:20	***Standards for Robotics in 2025*** *Chair: Mohammad Osman Tokhi, Sarah R. Fletcher* *Room: Sala de Atos*
12:20 – 12:40	#15: Design of Robot Application based on Software Information Model Standard *Hong Seong Park*
12:40 – 13:00	#27: Service Robot Safety Standardisation *Mohammad Osman Tokhi*
13:00 – 13:20	Modularity of Service Robots *Philip Lance*
13:20 – 14:40	***Lunch Break*** *Room: Sala de Refeições*

14:40 – 16:20	***Ensuring the Safety of AI and Robotics: An Interdisciplinary Approach to Global Standards and Governance*** *Chair: Kyoko Yoshinaga, Fumio Shimpo* *Room: Sala de Atos*
14:40 – 15:00	#21: Robo-Clerks and Cyber-Clerks as Forms of Bureaunoids: Applying Robotics and Cybernetic Avatars in AI-Driven Public Administration *Maciej M. Sokołowski*
15:00 – 15:20	#23: The Treatment of Privacy and Personal Data Protection in Engineering Ethics Education in Japan: A Legal Perspective *Michihiro Iwakuma*
15:20 – 15:40	#06:Ensuring Safety in the AITuber Age: Legal Challenges and Considerations in AI and Robotics *Takayuki Matsuo*
15:40 – 16:00	#09: Legal Policy on Digital Replicas *Kunifumi Saito*
16:00 – 16:20	#07: Controllability as a Core Principle for AGI Governance and Safety *Kyoko Yoshinaga*
14:40 – 16:00	***New Technology, Cybernetic Avatars and Their Economic Impact*** *Chair: Tatsuma Wada* *Room: F503*
14:40 – 15:00	#08: Exploring the Impact of Cybernetic Avatars and Head-Mounted Displays on Well-Being Across Multiple Countries *Shinichi Yamaguchi, Hidetaka Oshima, Satoshi Nakano, Sotaro Katsumata, Takeyasu Ichikohji, Eri Inoue, and Fumihiko Ikuine*
15:00 – 15:20	#13: Circuit Breakers for Stock Markets with Cybernetic Avatars *Tatsuma Wada*
15:20 – 15:40	#14: Anthropomorphism in Human-Computer Interaction *Wen Hai, Sotaro Katsumata, Shinichi Yamaguchi, Takeyashi Ichikohji, Satoshi Nakano and Fumihiko Ikuine*
15:40 – 16:00	#20: The Occupational Impact of Cybernetic Avatars on the Japanese Labor Market *Tatsuhiro Nakamori, Masahide Fukuyama, Yoshihiko Suhara and Hideyuki Kawashima*
16:20 – 16:40	***Coffee Break*** *Room: Sala de Refeições*
16:40 – 17:00	***ICRES2025 Closing Session*** *Room: Sala de Atos*

Format of presentations

Plenary presentations:
A 60-minute time slot has been allocated to plenary presentations; 45 minutes for presentation, 10 minutes for discussion/Q&A and 5 minutes for change over.

Regular and Special session presentations:
A 20-minute time slot has been allocated to each regular and Special session presentations; 15 for presentation, 3 minutes for discussion/Q&A and 2 minutes for change over.

Remote Participation

It is possible to remotely follow the conference using the following Teams links:

Sessions taking place at Sala de Atos

Microsoft Teams
Participar na reunião agora
ID da Reunião: 388 353 341 924 6
Código de acesso: vw6NY9Wz

Sessions taking place at Room F503

Microsoft Teams
Participar na reunião agora
ID da Reunião: 330 361 375 373 5
Código de acesso: RM7XH6sG

Conference Venue

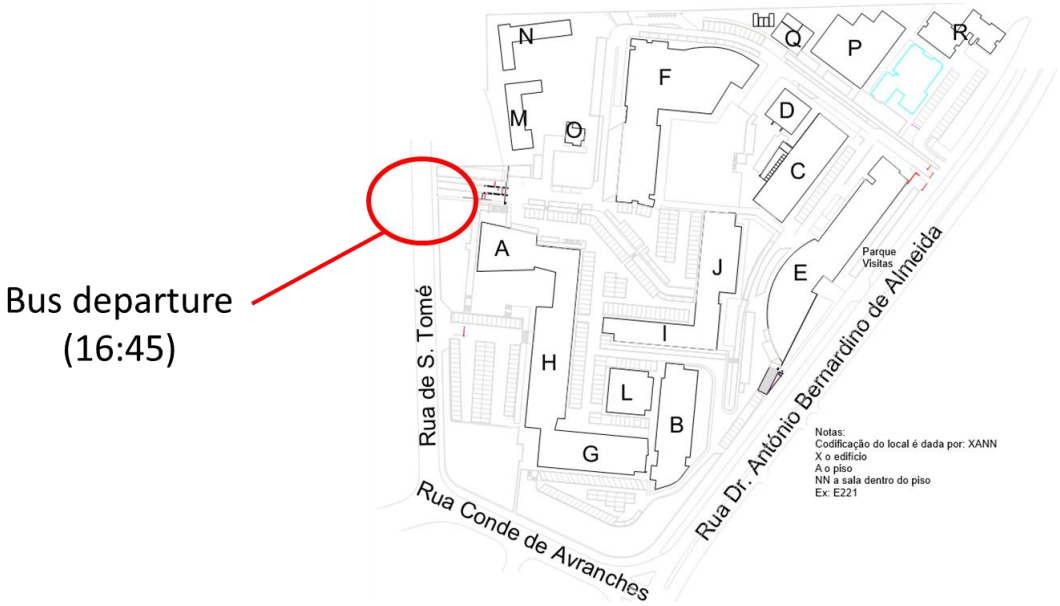
The conference will take place at ISEP. The address is:

Instituto Superior de Engenharia do Porto
Rua Dr. António Bernardino de Almeida, 431
4249-015 Porto
Portugal

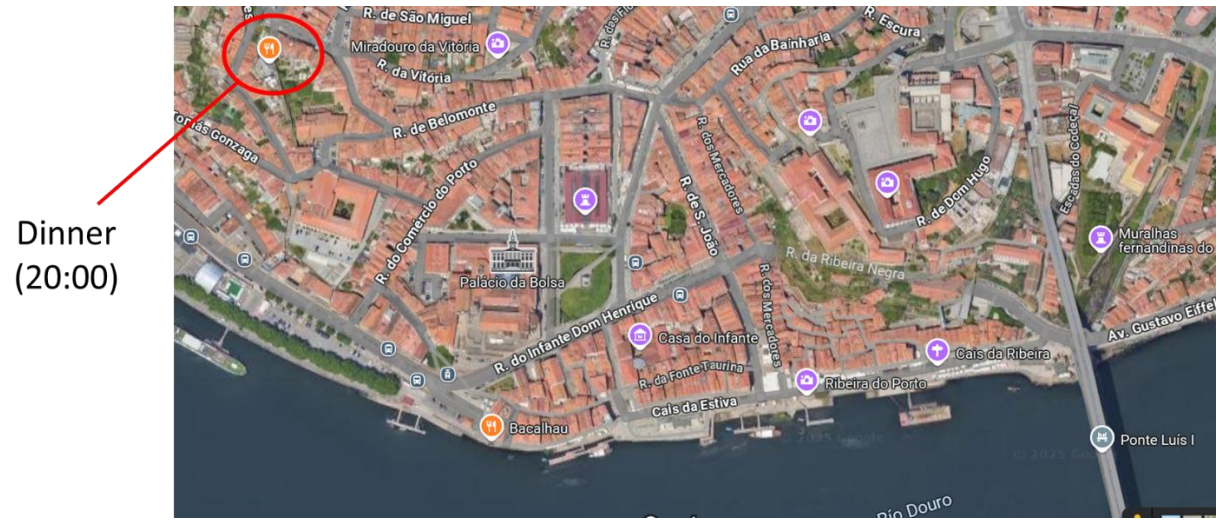
Map of the 1st floor of Building E – the registration and Opening Session will take place in this building.

Social Program

The Social Program will start Thursday at 16:45. The bus will departure from the bus stop next to ISEP's entrance on Rua de S. Tomé:



The conference banquest will take place on Thursday, at 20:00, at the Torreão Restaurante (https://www.torreao.pt/)
The address is: Rua das Virtudes, 37 – Porto



Paper Abstracts

#06: Ensuring Safety in the AITuber Age: Legal Challenges and Considerations in AI and Robotics
Takayuki Matsuo
Abstract: In the wake of rapid advancements in AI and robotics, the emergence of AITubers—content broadcasters operated entirely by artificial intelligence—has introduced novel legal challenges and safety concerns. This pa-per ex-amines the legal landscape surrounding AITubers within Japanese law, focusing primarily on civil liability. It begins by contrasting traditional VTubers, where a human operator is directly involved, with AITubers that lack an identifiable "person behind the avatar" (naka-no-hito). The discussion then explores the potential implications of granting AITubers legal personality, including the viability of treating them as corporate entities or unincorporated associations, and how such recognition might affect the allocation of legal responsibilities.
Furthermore, the paper analyzes scenarios in which AITubers may act as perpetrators of defamation or other harmful acts, as well as cases where they become targets of defamatory or malicious attacks. Special attention is given to the responsibilities of AITuber operators, including the necessity of implementing safeguards to prevent the generation of problematic content, and the role of commenters in influencing AI behavior. By evaluating theories such as Saito's approach to avatar legal personality, the study argues that, despite emerging complexities, existing legal frame-works may still adequately address the challenges posed by AITubers.

#09: Legal Policy on Digital Replicas
Kunifumi Saito
Abstract: This paper examines the legal frameworks governing digital replicas in the United States and Japan, with a focus on recent legislative developments and case law. It analyzes New York's 2020 and California's 2024 amend-ments restricting the use of digital replicas, as well as proposed federal leg-islation such as the NO FAKES Act. While U.S. jurisdictions have enacted explicit statutory protections, Japan relies on judicial interpretation of per-sonality rights, including portrait and publicity rights established by Su-preme Court decisions in 2005 and 2012.
The study highlights key differences: U.S. laws explicitly address post-mortem rights, whereas Japanese personality rights are generally considered non-transferable and non-inheritable. Japan's potential legislative re-sponse, particularly through unfair competition law reform, aligns with scholarly perspectives linking publicity rights to trademark law.
The paper concludes that Japan requires legislative intervention to regu-late digital replicas, particularly regarding post-mortem rights and licensee standing. Any comprehensive framework must balance protection with free speech considerations by incorporating explicit exemptions for news, criti-cism, parody, and biographical works, as well as case-specific defenses.

#10: Ethical Chatbot Creation of Real People
Karen Lancaster
Abstract: There are people with whom we would like to engage, but are unable to do so—such as celebrities and deceased relatives. Chatbots imitating these people putatively offer the next best thing. However, creating chatbots of real people can be morally problematic. This paper explores these problems, and presents six desiderata for the ethical creation of chatbots imitating real people. Firstly, it is important to obtain consent from the subject being imitated, or in the case of deceased persons, their living relatives. Second, any profits generated should be fairly distributed. Third, one should not exploit vulnerable persons when creating chatbots. Fourth, creators must ensure that their chatbots are as accurate as possible, to avoid reputational damage to subjects being imitated. Fifth, it is morally preferable to keep chatbots—and the conversations they generate—private. Sixth, chatbots which benefit users are morally preferable to those that harm users. If these desiderata are followed, then this will help ensure that creation of chatbots of real people remains ethically sound.

#11: Towards Ethical Foundation Models in Robotics: Challenges and Proposals
Ergina Kavallieratou
Abstract: Foundation Models (FMs) have emerged as a transformative force in artificial intelligence, enhancing robotic systems with advanced perception, de-cision-making, and human-robot interaction capabilities. However, their integra-tion into robotics raises significant ethical concerns, including issues of bias, transparency, and safety. This paper examines the ethical challenges associated with FMs in robotics and explores strategies to mitigate bias, improve explaina-bility, and establish regulatory standards. By leveraging fairness-aware training, Explainable AI (XAI) frameworks, and compliance with emerging guidelines such as IEEE and the EU AI Act, ethical AI deployment in robotics can be achieved. Future research should focus on refining these approaches to ensure that FM-driven robotic systems operate in a fair, interpretable, and safe manner.

#12: Human Rights in the Use of Enhancement Technologies
Yingjiao Zhu
Abstract: This paper examines the human rights issues that may occur in the use of enhancement technologies. While such technologies offer new opportunities for self-realization and human flourishing, they also raise ethical, legal, and social concerns, including inequality, discrimination, and coercion. A key question is how existing human rights frameworks should adapt to ensure fairness between enhanced and non-enhanced individuals. Rather than debating the overall benefits or moral implications of human enhancement, this paper explores the need for a new right concerning personal modification choices and legal interventions necessary for equitable technological implementation.

#15: Design of Robot Application based on Software Information Model Standard
Hong Seong Park
Abstract: With advancements in computing and networking, the need for standardized ro-bot software development has become crucial. This paper introduces the Software Information Model (SIM), based on ISO 22166-202, to enhance modularity, in-teroperability, and reusability in robot software. This paper applies the Software Information Model (SIM) to actual robots, including TurtleBot, Jackal, and Transbot, as well as software-defined robots (SDRs) such as TurtleBot and hu-manoid robots. The results demonstrate how SIM enhances software deployment efficiency and reduces development costs. The results verify that SIM-based SDR allows seamless integration across different robotic platforms while main-taining flexibility.

#16: The Societal Implementation of Cybernetic Avatars and Regulatory Challenges in Society 5.0
Mayu Terada
Abstract: The societal integration of Cybernetic Avatars (CAs) presents a range of legal, ethical, and regulatory challenges. While CAs have the potential to enhance human capabilities and promote social inclusion, their implementation remains largely unregulated, particularly in Japan. This paper examines the legal complexities associated with CAs, focusing on the ambiguity of their legal status and the uncertainty surrounding liability attribution. It underscores the necessity of establishing a fundamental legal framework to address these issues. This study advocates for the creation of a dedicated legal structure modeled after Japan's Barrier-Free Act, emphasizing the importance of ensuring equitable access and responsible governance. Additionally, it explores the potential enactment of a Cybernetic Avatar Social Inclusion Promotion Act, proposing policies aimed at fostering inclusive participation and mitigating associated risks. Furthermore, the ethical dimensions of CA-mediated interactions, including identity authentication, algorithmic bias, and personal data protection, are analyzed. Establishing a foundational legal framework to address these regulatory gaps is essential for facilitating the ethical integration of CAs while balancing technological innovation with legal and societal safeguards.

#17: Metaverse-Based Trials: Exploring the Legal Implications and Challenges
Jingying Pan
Abstract: The paper discusses the legal implications and challenges regarding metaverse-based trials which have been tested in countries such as Colombia and China. These trials demonstrate the potential transformation of judicial proceedings, but also raise various challenges, including reliance on

technology developers and service providers for due process and challenges to traditional courtroom procedures. This paper analyzes these opportunities and challenges through a comparative legal perspective, and highlights solutions for responsibly adopting such technology in trials. By addressing these three perspectives, the paper aims for integrating CAs(Cybernetic Avatars) into society while ensuring technological, legal, and ethical considerations are met.

#18: Affordances and Barriers in AI Ethics: Rethinking AI Ethics Education for Developers
Rosa Hyun Kyong Lee
Abstract: This study examines the ethical challenges faced by AI developers and proposes targeted educational approaches to address them. Through an expert survey of 30 AI practitioners in South Korea conducted in 2024, the author identified significant gaps in ethics education, with 87% of respondents reporting no prior ethics training despite 43.3% encountering ethical dilemmas in their work. The research reveals that developers primarily learn ethical considerations through direct work experience rather than formal education, with executive leadership perceived as bearing primary responsibility for ethical AI design. Key ethical dilemmas emerged across five categories: technological limitations, external environment constraints, industry culture pressures, stakeholder interactions, and unintended consequences. Respondents identified privacy protection, data governance, and accountability as the most critical ethical principles, while perceiving enhanced consumer trust and improved corporate reputation as primary benefits of ethical AI development. The findings suggest that effective AI ethics education should integrate case-based learning with practical decision-support tools, mandate baseline ethics training, expand access to educational resources, and emphasize the economic benefits of ethical AI development while addressing concerns about innovation speed and resource constraints.

#19: Automation Bias in the AI Act: On the Legal Implications of Attempting to De-Bias Human Oversight of AI
Johann Laux and Hannah Ruschemeier
Abstract: This paper examines the legal implications of the explicit mentioning of automation bias (AB) in the Artificial Intelligence Act (AIA). The AIA mandates human oversight for high-risk AI systems and requires providers to enable awareness of AB, i.e., the tendency to over-rely on AI outputs. The paper analyses how this extra-juridical concept is embedded in the AIA, the division of responsibility between AI providers and deployers, and the challenges of legally enforcing this novel awareness requirement. The analysis shows that the AIA's focus on providers does not adequately address potential causes of AB that remain in the control of deployers, such as the organisational context of human oversight, and questions whether the AIA should directly regulate the risk of AB rather than just mandating awareness. As the AIA's approach requires a balance between legal mandates and behavioural science, the paper proposes that harmonised standards should reference the state of research on AB and human-AI interaction. Ultimately, further empirical research will be essential for effective safeguards.

#20: The Occupational Impact of Cybernetic Avatars on the Japanese Labor Market
Tatsuhiro Nakamori, Masahide Fukuyama, Yoshihiko Suhara and Hideyuki Kawashima
Abstract: Cybernetic avatars (CAs) are robotic embodiments remotely controlled by human operators, offering new possibilities in telepresence, healthcare, and hazardous environments. We use a data-driven approach to estimate the occupational impact of CAs in the Japanese labor market. Inspired by previous work in labor economics, we used occupational task descriptions and a large number of patents and calculated the overlap between the texts to estimate the occupational impact on the tasks, which are then aggregated into the occupational level as CA exposure scores.

#21: Robo-Clerks and Cyber-Clerks as Forms of Bureaunoids: Applying Robotics and Cybernetic Avatars in AI-Driven Public Administration
Maciej M. Sokołowski
Abstract: The ongoing Artificial Intelligence (AI) boom has not left public administration untouched. Alongside the challenge of regulating AI, governments confront the necessity of integrating AI into their own operations. With the increasing adoption of e-government services and recent AI-driven advancements, the level of automation in the e-state processes has significantly increased. Governments

now leverage algorithms and chatbots to serve both individuals and corporations, enhancing online governmental websites, registers, and databases.
In the proposed paper, I advance this discussion by exploring the use of robots and cybernetic avatars to perform functions traditionally handled by public servants. To address this topic, I will structure the paper into two parts: a theoretconceptualical section, based on dogmatic and comparative analysis, and a practical section, stemming from a proposed field experiment.
First, I will outline a theoretical framework for integrating robots and cybernetic avatars into public administration. This section will include definitions, typologies, and a discussion of the challenges and opportunities presented by robo- and cyber-clerks, along with scenarios where robo- and cyber-clerks could replace human public servants. It will also explore regulatory matters related to the secure operation of these “bureaunoids”.
Second, I will discuss how an experiment involving a robot and/or a cybernetic avatar could be conducted to explore the practical implications of employing robo-clerks and/or cyber-clerks within Japanese public administration. Such an experiment could examine legal challenges and the potential responses of both public servants and residents interacting with the robo-clerk and/or cyber-clerk. The design might involve pre- and post-experiment surveys and interviews to compare theoretical assumptions with practical outcomes, should the experiment be implemented. Conducting such an experiment could present challenges, including legal, organizational, and social issues. If any failures were to arise in this hypothetical endeavor – such as technical difficulties or resistance from participants – I will consider how they could be addressed in the analysis.

#22: Ethical Risk Assessment for Collaborative Robots: Surfacing Potential Hazards and Risks in Assistive Robot Systems
Khairidine Benali and Praminda Caleb-Solly
Abstract: Traditional risk assessments primarily focus on safety, while research ethics committees and emerging ethical standards for AI and Robotics emphasize ethical considerations. However, a new approach is emerging: integrating ethical risk assessment (ERA) into the safety evaluations of intelligent systems, creating a more comprehensive and unified framework. This merging of perspectives allows for systematic identification and mitigation of the ethical, social, and environmental risks and hazards associated with the use of robots and artificial intelligence, particularly pertinent in challenging real-world contexts where robots are increasingly being used in assistive applications.
This paper presents an ethical risk assessment within the context of human-robot collaboration, with a specific focus on assistive robots which could be typically encountered in health and social care environments. We systematically review each ethical risk category (Societal, Application, Financial/Commercial and Environmental), as well as physical safety related risks associated with the deployment of collaborative assistive robots. Additionally, we examine the strengths and weaknesses of ERA in this context.

#25: Should It Be Illegal To Mistreat Robots? Yes
Selmer Bringsjord
Abstract: I present an analogical argument for the title of the present chapter. The argument starts with a thought-experiment involving the severe! mistreatment of a sub-group of agents within a larger population thereof. (There is no typographical error in the preceding sentence: I write 'severe!' rather than 'severe,' for reasons to be explained.) An explication of *cognitive consciousness*, a type of consciousness some readers may be unfamiliar with, is crucial, and is provided in summative form. The chapter ends with my making a connection between my argument and the interesting "chatbots" now in the world (i.e. so-called *language language models* (LLMs) such as LaMDA, GPT-k, Galactica, and whatever new one may have arrived on the scene by the time you read this sentence). The first of the artificial agents in my list was claimed to be sentient by an employee of Google, who keeping with that claim considered much conversation with LaMDA to constitute immoral mistreatment of it. Such a position, if I'm right, were it to include correct ascriptions of certain crucial properties to an LLM, would in fact be veridical. The crucial properties are three in number, and are discussed herein.

#26: Reflections on Autonomy
Isabel Ferreira
Abstract: The present paper aims to provide a unifying epistemological framework capable of shedding light on the nature of the concept of [autonomy] contributing, this way, to clarify a fundamental term, transversal to both natural and artificial cognition. The concept applies to a variety of domains from moral and political theory to bioethics, education, and many others reflecting a phenomenon that we claim is universal and transversal, i.e., [autonomy] is a defining feature for all life forms and consequently horizontal to distinct domains. Aiming to contribute to clarifying the nature and scope of a concept whose semantic substance pertains to the definition of artificial systems and their level of liability, the present chapter assumes a biologically- motivated approach by claiming that:
(i) [autonomy] is an essential feature inherent to all life systems and an imperative to their existence
(ii) Functional Fitness is the primary condition for autonomy.
(iii) Though being primarily an individual feature it extends to collections of individuals functioning as a whole.
(iiii) Autonomy determines Agency, i-e. only autonomous entities can be full-fledged agents.

#27: Service Robot Safety Standardisation
Mohammad Osman Tokhi
Abstract: The service robot sector has developed rapidly over the last decade due to the extensive need in a range of applications and environments. Safety standards for service robots have similarly been rigorously developed in support of the robotic industry and to meet the market demands. The types of service robots currently considered include mobile robots, stationary robots, wearable/assistive robots. From application viewpoint, these are categorised into non-medical and medical applications and considered as such in the development of standards. The environments of use are wide ranging including domestic to public sectors.
This presentation will focus on safety standardisation efforts of service robots within the International Organization for Standardisation (ISO). A brief history of the robotic standardisation work over the last two decades will be presented. This includes the evolution of the ISO robotics committee structure and its current composition, the range of standards work developed in the ISO committee working groups and jointly with those of International Electrotechnical Commission (IEC).
The ISO 13482:2014 (Robots and robotic devices – Safety requirements for personal care robots) is the first ISO safety standard developed for service robots. The standard covers three types of robots for personal care, namely mobile servant robot, physical assistant robot and person carrier robot. Since publication of the standard there has been extensive development in the service robotic sector where new robot mechanisms and systems have emerged for various applications and environments. Thus, to address the safety requirements of the emergent service robotics sector, revision of the standard to cover the wider service robotic sector is currently carried out by the Working Group 2 (Service Robot Safety) of the ISO Robotics Technical Committee TC299. The presentation will provide details of the revision and the current status of the work done.

#28: The Convergence of Deepfake AI, Robotics, and Human-Robot Collaboration: Ethical Implications and Future Prospects
Seemal Asif
Abstract: The convergence of deepfake AI, robotics, and human-robot collaboration (HRC) is transforming industries by enabling lifelike avatars, speech synthesis, and adaptive AI-driven interactions. While these advancements enhance education, healthcare, and industry, they also raise ethical concerns regarding misinformation, identity fraud, privacy, and job displacement. The potential for AI-generated deception challenges trust in robotic systems, necessitating robust governance frameworks to ensure transparency and accountability.
This paper explores the ethical and technical implications of deepfake-enhanced robotics, examining global AI regulations (EU AI Act, IEEE, ISO 42001, NIST AI RMF) and emerging best practices for responsible deployment. Case studies illustrate how compliance with ethical standards can mitigate AI risks, ensuring deepfake-enhanced robotics augment human capabilities without compromising security or integrity. Ultimately, inclusive AI governance, algorithmic fairness, and digital provenance

mechanisms are crucial to aligning deepfake AI with societal values, fostering trust in the future of AI-driven HRC.

#29: A Logical Analysis for Detecting AI Bias
Tim Lee, Hyun-Cheol Choi and Sunyong Byun
Abstract: This study aims to establish a logical foundation for identifying and address-ing bias in AI technology. Bias is not merely an error but an inevitable out-come of human cognition and social structures, necessitating ethical efforts to analyze and adjust rather than eliminate it entirely. AI bias can reflect or even amplify societal inequalities, requiring careful scrutiny in data collec-tion, processing, and algorithm design. A key issue is the fallacy of hasty generalization, where AI, like humans affected by confirmation or availabil-ity bias, draws overly broad conclusions from limited or skewed data. Bias is often multifaceted, emerging from the interplay of data, algorithmic, and so-cial factors that reinforce one another. Addressing AI bias requires diverse and representative data collection, ongoing algorithmic refinement, and pro-active ethical design. A crucial starting point for ensuring fairness and relia-bility in AI decision-making is recognizing and mitigating logical fallacies that lead to distorted outcomes.

#30: When Tools Are Co-Actors
Isabel Ferreira and Joao Sequeira
Abstract: Human historical narrative with its distinct economic, social and cultural phases is also a scientific and technological evolutionary narrative in which accumulated knowledge , know-how and innovation constitute the means re-quired to answer specific economic and social challenges and the needs of people at different times. The introduction of new tools has always had an impact on the economy, changing the relations of production, the work settings and peer interaction, often determining new routines, new lifestyles, new ways of living. According to [1], [2] the deployment of artificial intelligent systems (either embodied or nonembodied) in the 21st century, has introduced a fundamen-tal twofold ontological shift with deep anthropological consequences:
(i) tools have lost their inherent purely instrumental status and have suddenly become potentially autonomous entities capable of agency.
(ii) environments, on the other hand, have acquired a hybrid nature, where the analogic and the digital merge and where the physical and the virtual converge, where natural intelligence and autonomous artificial systems co-habit in a fusion that blurs the lines between the physical, the digital and the biological.
This ontological shift brings about the most profound change in the nature of the typical human relationship with tools. The present paper will address the misuse of AI technology at the workplace from a particular case study, highlighting how deeply this misuse can affect human beings' well-being and dignity.
Finally the paper will address the contribution of the International Conference on Robot Ethics and Standards as a dedicated forum to discuss how intelligent technologies should be designed to contribute to human flourishing and happiness

#31: Mapping Ethics in EPS@ISEP Robotics Projects
Benedita Malheiro, Pedro Guedes, Manuel Silva and Paulo Ferreira
Abstract: The European Project Semester (EPS), offered by the Instituto Superior de Engenharia do Porto (ISEP), is a capstone programme designed for undergraduate students in engineering, product design, and business. EPS@ISEP fosters project-based learning, promotes multicultural and interdisciplinary teamwork, and ethics- and sustainability-driven design.
This study applies Natural Language Processing (NLP) techniques, specifically text mining, to analyse project papers produced by EPS@ISEP teams. The proposed method aims to identify evidence of ethics-based decision-making within EPS@ISEP projects.
An innovative keyword mapping approach is introduced that first defines and refines a list of ethics-related keywords through prompt engineering. This enriched list of keywords is then used to systematically map the content of project papers.
The findings indicate that the EPS@ISEP robotics project papers analysed demonstrate awareness of ethical considerations and actively incorporate ethics-oriented decision-making into design processes.

The method presented is adaptable to various application areas, such as monitoring compliance with responsible innovation or sustainability policies.

#32: Assessing the skills gap for industrial operators in Industry 5.0
Vaishnavi Sashidharan, Iveta Eimontaite and Sarah Fletcher
Abstract: The 'Industry 5.0' vision aims to prioritize the experience of the worker in the production process and maintain workforce sustainability and resilience. This human-centric ideology is not simply limited to centralizing the operator's role in the industrial process but also involves empowering operators to perform their roles in the future smart-production systems. In order to do so, it becomes crucial to identify the skills required by operators to perform their roles in future industrial systems and develop means to bridge a skill gap if it exists.
The following paper presents a study that is a part of the CONVERGING project, to investigate the existence of a skill gap for operators of Industry 5.0. The CONVERGING project aims to develop and deploy smart-production systems for four industrial use cases. In each use case, a manually performed task is being redesigned to leverage collaboration between human operators and smart machines such as collaborative robots and AGVs.
The current study's aim is twofold – firstly, to identify the current skill set of the operators and the skills expected from them to perform the future roles proposed by the CONVERGING solutions. The second aim is to assess whether there is a gap between the operators' current skills and the skills expected from them in the future systems. To meet the first aim, a list of skills was finalised through a literature review and a task decomposition of the current manual task and the proposed future task. This step determined that operators' skills can be divided into three categories – soft skills (intrapersonal and interpersonal skills), technical skills (task-specific skills) and technological skills (skills for using new technologies). The final list of soft skills and technological skills were common for all use cases, while the technical skills were specific to each use case. To meet the second aim, an online survey was developed using the list of skills identified in the previous step. The respondents of the survey had to give two ratings for each skill between 0 – 100. One rating was for the operators' current level of the skill and the second rating was for the relevance of that skill in their future roles. Therefore, by subtracting the former from the latter, a score indicating the gap in the skill was determined.
The results from the survey revealed that technological skills have the biggest gaps. These are skills related to the ability to use and interact with the smart technologies in the future CONVERGING solutions, such the AR headset, smart pen, smart watch, touch screen tablet and robot. The implications of these findings are discussed with a focus on the means to bridge the gap for these technological skills.

#34: Towards collective imagining of an open-sourced, living robotics lexicon
Matimba Swana, Kit Kuksenok and Suet Lee
Abstract: How can collective storytelling shape the terminology, understanding, and governance of robotics? Technical terms like "autonomous" carry layered meanings that influence engineering design, public perception, ethical debates, and policy decisions. In this paper, we use vignettes to illustrate the need for a more inclusive participatory discourse around the social and technical dimensions of robotics. We propose collective storytelling and imagination as practices to bridge the gap between colloquial and technical language in robotics. Specifically, we propose the development of a Living Robotics Lexicon, a dynamic, open-source resource created through collaborative workshops, to capture and examine the evolving narratives and definitions of robotics terminology. The objective of the lexicon will be to promote engagement with robotics by establishing a shared vocabulary and language. We invite the robotics community to collaborate with us in creating a lexicon that both informs and adapts to emerging narratives.

#35: Telling your employees they need to work with a robot? Are there safety standards for that?
Sarah Fletcher
Abstract: For a long time robots at work were heavy and dangerous machines that safety standards decreed needed to be kept away from human workers for their protection. This caused significant disturbances to workflow because it separated the robot's accuracy and repeatability from the human's flexibility and cognitive reasoning skills. However, over time this problem has been solved. Advanced sensor technologies now enable ubiquitous monitoring and safety controls that enable safe and close

proximity human-robot interaction - regardless of the robot's payload. As robot safety standards have also now been updated to catch up with these technological advances, they provide the guidance that businesses need to install human-robot systems with con-fidence that the robot will not be able to physically injure their employees. Of course this offers an attractive investment: the possibility to improve effi-ciency by uniting the different skills that people and robots provide so that they complement each other in shared tasks. But, do we really know all of the safety issues that we need to consider for this new way of working? When an employee is now asked to work with a robot - are our current safety standards really enough? This paper discusses the current state of standards for human-robot collaboration from the human factors perspective.

#36: Integrating Human-Centred Design in AI-based Automation in Manufacturing: Ethical challenges and findings from Participatory Design Operator Workshops

Maryam Bathaei Javareshk, Iveta Eimontaite and Sarah Fletcher

Abstract: Understanding human needs and the ways that workplace design can effectively address these needs is fundamental for improving the productivity and sustainability of a workforce. As automation increasingly replaces manual tasks in advanced manufacturing, it is crucial that human factors are considered throughout the stages of design and implementation. Initiatives like the EU AI-PRISM project aim to integrate human-centred design into new AI-based automation solutions to foster effective collaboration between humans and robots in challenging automated environments. AIPRISM seeks to enhance productivity by combining advanced technology with human skills, but incorporating human-centred design throughout design and implementation will ensure that the automated solutions also meet the needs of their human operators within ethical. The study described in this paper aims to identify the task-related challenges faced by current operators—from novices to experts—in four of the project's use cases in manufacturing companies. To achieve this, four participatory design workshops were conducted to gather valuable feedback on the planned AIPRISM automation solutions and capture operator requirements across different manufacturing sectors: wooden furniture, photonics and microelectronics, white goods and brewery. The workshops incorporated group interviews, lasting about one hour each, that provided a platform for operators to share their experiences, concerns, and suggestions regarding the integration of AI and robotics into their daily tasks. The results revealed that operators across all groups faced challenges with fault detection, precision, and repetitive tasks. Responses also included a number of recommendations for the design of AI-based automation to address these challenges including enhanced interaction interfaces, human oversight for precision tasks and robotic assistance. In conclusion, the findings from this research highlight the importance of aligning human skills with automated technologies, which can lead to a more efficient and effective future for manufacturing.