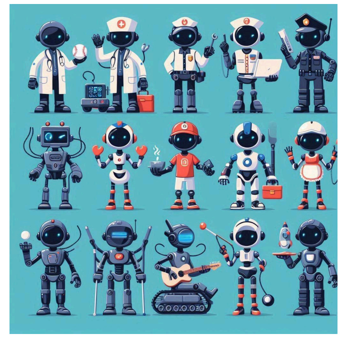
Robots and AI (Robotics)	

An AI Generated Overview of Robots and AI (Robotics) - - - (WARNING - Hallucinations are possible)

Microsoft Copilot (ChatGPT 4) - 11/12/2024 … Robots and AI (Robotics)
(Prompt - Please provide an overview of challenges and breakthroughs in robotics. Please make your response roughly 800-1000 words in length and appropriate for a college audience.)

Challenges and Breakthroughs in Robotics

Introduction

Robotics is a rapidly evolving field that intersects with various disciplines, including artificial intelligence (AI), mechanical engineering, and computer science. The development of robots has the potential to revolutionize industries, from manufacturing to healthcare. However, the journey towards creating advanced robots is fraught with challenges. Simultaneously, significant breakthroughs are paving the way for more sophisticated and capable robotic systems. This overview will explore the key challenges and recent breakthroughs in robotics.

Challenges in Robotics

1. **New Materials and Fabrication Methods**

One of the fundamental challenges in robotics is the development of new materials and fabrication methods. Traditional robots are often constructed from rigid materials like metals and plastics, which can limit their flexibility and adaptability. Researchers are exploring soft robotics, which uses materials that can mimic the flexibility and resilience of biological tissues. These materials can enable robots to perform tasks that require delicate handling and adaptability, such as medical procedures or interacting with humans.

2. **Power and Energy Efficiency**

Robots typically require significant amounts of power to operate, which can limit their functionality and autonomy. Improving battery life and developing more efficient power sources are critical challenges. Current research is focused on creating batteries that are lighter, more durable, and capable of storing more energy. Additionally, there is interest in developing robots that can harvest energy from their environment, such as through solar power or kinetic energy.

3. **AI and Machine Learning Integration**

AI is essential for enabling robots to perform complex tasks autonomously. However, integrating AI into robotics presents several challenges. One major issue is developing AI that can reason and make decisions in real-time, similar to human intelligence. This requires advancements in machine learning algorithms and computational power. Moreover, ensuring that AI systems can learn from minimal data and adapt to new situations is crucial for the development of versatile robots.

4. **Navigation and Perception**

For robots to operate effectively in unstructured environments, they need advanced navigation and perception capabilities. This includes the ability to map and understand their surroundings, avoid obstacles, and interact with objects and people. Current challenges include improving the accuracy and reliability of sensors and developing algorithms that can process sensory data in real-time. Advances in computer vision and sensor technology are critical for overcoming these challenges.

5. **Human-Robot Interaction**

As robots become more integrated into daily life, ensuring safe and effective human-robot interaction is paramount. This involves designing robots that can understand and respond to human emotions, gestures, and commands. Additionally, ethical considerations, such as ensuring privacy and preventing misuse, are significant challenges. Researchers are working on developing robots that can communicate naturally with humans and adhere to ethical guidelines.

6. **Ethical and Social Implications**

The deployment of robots raises various ethical and social issues. These include concerns about job displacement, privacy, and the potential for robots to be used in harmful ways. Addressing these issues requires a multidisciplinary approach, involving ethicists, policymakers, and technologists. Establishing regulations and guidelines for the responsible use of robotics is essential to mitigate these concerns.

Breakthroughs in Robotics

1. **Soft Robotics**

Recent advancements in soft robotics have led to the development of robots that can perform tasks requiring a high degree of flexibility and sensitivity. These robots are made from materials that can bend, stretch, and adapt to their environment, making them ideal for applications in healthcare and human-robot interaction. For example, soft robotic grippers can handle delicate objects without causing damage, which is beneficial in industries like food processing and medical surgery.

2. **AI-Driven Robotics**

AI has significantly enhanced the capabilities of robots, enabling them to perform complex tasks with greater autonomy. Breakthroughs in machine learning and neural networks have allowed robots to learn from experience and improve their performance over time. For instance, robots equipped with AI can now navigate complex environments, recognize objects, and even understand human speech and gestures. This has opened up new possibilities for robots in areas such as autonomous vehicles, personal assistants, and industrial automation.

3. **Advanced Sensing and Perception**

Improvements in sensor technology have greatly enhanced the perception capabilities of robots. High-resolution cameras, LIDAR, and other advanced sensors allow robots to create detailed maps of their surroundings and detect objects with high precision. These advancements are crucial for applications like autonomous driving, where accurate perception is essential for safety. Additionally, new algorithms for processing sensory data have improved the ability of robots to understand and interact with their environment.

4. **Collaborative Robots (Cobots)**

Collaborative robots, or cobots, are designed to work alongside humans in a shared workspace. These robots are equipped with advanced safety features that allow them to operate safely in close proximity to people. Cobots are increasingly being used in manufacturing, where they can assist with tasks that are repetitive or require precision. Their ability to collaborate with human workers enhances productivity and reduces the risk of injury.

5. **Bio-Inspired Robotics**

Bio-inspired robotics involves designing robots that mimic the behavior and characteristics of living organisms. This approach has led to the development of robots that can move and adapt in ways similar to animals. For example, researchers have created robots that can swim like fish, fly like birds, and crawl like insects. These robots have potential applications in exploration, environmental monitoring, and search and rescue operations.

6. **Autonomous Navigation**

Significant progress has been made in the field of autonomous navigation. Robots can now navigate complex and dynamic environments with minimal human intervention. This is particularly evident in the development of self-driving cars, which use a combination of sensors, AI, and advanced algorithms to navigate roads safely. Autonomous navigation is also being applied in drones, which can be used for tasks such as aerial surveying and delivery services.

The field of robotics is advancing rapidly, with significant breakthroughs addressing many of the challenges that have historically hindered progress. From soft robotics and AI-driven systems to advanced sensing and bio-inspired designs, these innovations are paving the way for more capable and versatile robots. However, challenges such as power efficiency, ethical considerations, and human-robot interaction remain critical areas of focus. As research and development continue, the potential for robotics to transform various industries and improve our daily lives becomes increasingly apparent.

Human Views on Robots and AI (Robotics) - - - (WARNING - Humans are fallible)

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[UNI only] Frana, P. L. (2021). **Caregiver Robots.** In Philip L. Frana, & Michael J. Klein. *Encyclopedia of Artificial Intelligence: The Past, Present, and Future of AI* (pp. 63-70). ABC-CLIO. https://login.proxy.lib.uni.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=e000xna&AN=2895727&site=ehost-live&ebv=EB&ppid=pp_63

[UNI only] Gunkel, D. J. (2021). **Robot Ethics**. In Philip L. Frana, & Michael J. Klein. *Encyclopedia of Artificial Intelligence: The Past, Present, and Future of AI* (pp. 283-286). ABC-CLIO. https://login.proxy.lib.uni.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=e000xna&AN=2895727&site=ehost-live&ebv=EB&ppid=pp_283

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Shorter Podcasts and Videos

AI News: This Week In Robots
AI for Humans - Gavin Purcell and Kevin Pereira (6:12)
(March 1, 2024) [Video]
https://www.youtube.com/watch?v=fq3Fd8paFgs

The AI Robotics Revolution: Robots That Think Like LLMs
AI Daily Brief - Nathaniel Whittemore (7:47)
(July 31, 2023) [Video]
https://www.youtube.com/watch?v=j0LUbOx_RME

Boston Dynamics Shows Next Frontier in Robotics
AI Daily Brief - Nathaniel Whittemore (6:39)
(April 20, 2024) [Video]
https://www.youtube.com/watch?v=U6-drtC1qP0

ChatGPT Gets a Body with the Figure 01 Robot
AI Daily Brief - Nathaniel Whittemore (9:24)
(April 20, 2024) [Video]
htts://www.youtube.com/watch?v=ampaaKJ1c-U

How Humanoid Robots will Reshape the Workforce: Jobs of the Future
A Beginner's Guide to AI (11:00)
(September 7, 2023) [Podcast]
https://podcasts.apple.com/us/podcast/how-humanoid-robots-will-reshape-the-workforce-jobs/id1701165010?i=1000627076329

The machines are learning, and shocking the world's best.
AI for Humans - Gavin Purcell (2:01)
(September 1, 2023) [Video]
https://www.youtube.com/watch?v=Sw2-iU1Z65s

Sam Altman Hints at GPT-5, Hands-on with Runway Gen-3 & So Much Robot News (Robot Watch)
AI for Humans - Gavin Purcell and Kevin Pereira (31:09 - 41:33)
(July 4, 2024) [Video]
https://www.youtube.com/watch?v=7SYAjyTXMJc&t=1869s

The State of AI for Robotics
AI Daily Brief - Nathaniel Whittemore (10:28)
(March 14, 2025) [Video]
https://www.youtube.com/watch?v=LZCqmR1L3V0

Why don't we have better robots yet?
TED - Ken Goldberg (12:10)
(September, 2023) [Video]
https://www.ted.com/talks/ken_goldberg_why_don_t_we_have_better_robots_yet?subtitle=en

Longer Podcasts and Videos

Breaking New Ground With Collaborative Robots
Infinite Machine Learning with Prateek Joshi - Brad Porter (49:22)
(July 2, 2024) [Podcast]
https://podcasts.apple.com/ga/podcast/breaking-new-ground-with-collaborative-robots/id1615142314

How AI robots learn just like babies — but a million times faster w/ NVIDIA's Rev Lebaredian
The TED AI Show and Bilawal Sidhu - Bilawal Sidhui and Rev Lebaredian (53:00)
(December 2, 2024) [Podcast]
https://podcasts.apple.com/us/podcast/how-ai-robots-learn-just-like-babies-but-a-million/id1741574582?i=1000678966760

Ken Goldberg on why your robot butler isn't here yet
80,000 Hours - Luisa Rodriguez and Ken Goldberg (2:01:42)
(September 13, 2024) [Podcast]
https://80000hours.org/podcast/episodes/ken-goldberg-robotics/

Robot revolution and our food future, with Rajat Bhageria
Pioneers of AI - Rana el Kaliouby and Rajat Bhageria (34:00)
(January 18, 2025) [Podcast]
https://podcasts.apple.com/us/podcast/the-robot-revolution-and-our-food-future/id1763085968?i=1000684064022

Robotics Research Update, with Keerthana Gopalakrishnan and Ted Xiao of Google DeepMind
The Cognitive Revolution - Nathan Labenz, Gopalakrishnan, Keerthana & Xiao, Ted. (1:28:18)
(April 22, 2024) [Video]
https://www.cognitiverevolution.ai/robotics-research-update-with-keerthana-gopalakrishnan-and-ted-xiao-of-google-deepmind-2/

Sergey Levine: Decoding The Evolution of AI in Robotics
Eye on AI - Craig Smith and Sergey Levine (0:42:56)
(March 17, 2024) [Video]
https://www.youtube.com/watch?v=Tk1pX_IMYzQ

We Tried Amazon's New 1 Hour Drone Delivery
Hard Fork - Kevin Roose and Casey Newton (1:04:38)
(December 20, 2024) [Video]
https://www.youtube.com/watch?v=QcxfcMmdRCM

Magazine and Newspaper Articles

[UNI only] Charlton, Lauretta. (2024, August 9). 30 minutes with the 'world's most advanced' massage robot: A.I.-informed massage robots will arrive at some Equinox gyms this month. I gave one a try. *New York Times*. https://www.nytimes.com/2024/08/09/well/massage-robot.html

Khalid, Amrita. (2024, January 4). **Google wrote a 'Robot Constitution' to make sure its new AI droids won't kill us: The data gathering system AutoRT applies safety guardrails inspired by Isaac Asimov's Three Laws of Robotics.** *The Verge*. https://www.theverge.com/2024/1/4/24025535/google-ai-robot-constitution-autort-deepmind-three-laws

[UNI only] Mozur, Paul & Satariano, Adam. (2024, July 4). **A.I. begins ushering In an age of killer robots**. *New York Times*. https://www.nytimes.com/2024/07/02/technology/ukraine-war-ai-weapons.html

[UNI only] Nolan, Erin. (2024, July 6). **For older people who are lonely, is the solution a robot friend?** *New York Times*. https://www.nytimes.com/2024/07/06/nyregion/ai-robot-elliq-loneliness.html

Pattison Tuohy, Jennifer. (2024, April 19). **Maybe I don't want a Rosey the Robot after all: Boston Dynamics' latest — deliberately creepy? — humanoid robot has me rethinking my smart home robot dreams.** *The Verge*. https://www.theverge.com/2024/4/19/24134905/boston-dynamics-atlas-robot-smart-home-robot

[UNI only] Plumer, Brad. (2024, July 30). **Robots are coming, and they're on a mission: Install Solar Panels: Energy companies say a labor shortage is one big obstacle to installing more solar power. They're turning to machines to speed things up**. *New York Times*. https://www.nytimes.com/2024/07/30/climate/solar-panels-robots-maximo-construction.html

Vincent, James. (2018, August 2). **New study finds it's harder to turn off a robot when it's begging for its life: The robot told test subjects it was scared of the dark and pleaded 'No! Please do not switch me off!'.** *The Verge*. https://www.theverge.com/2018/8/2/17642868/robots-turn-off-beg-not-to-empathy-media-equation

Vincent, James. (2022, December 7). **San Francisco reverses plans to allow police robots to kill suspects: The city's supervisors reversed the controversial policy following outcry from citizens and advocacy groups. They've sent the issue back to a committee for further review**. *The Verge*. https://www.theverge.com/2022/12/7/23497922/killer-robot-policy-san-francisco-reversed

Weatherbed, Jess. (2024, April 2). **Alaska will try to use a robot to scare wildlife from around an airport: he Aurora Boston Dynamics robot is being trialed to prevent harmful encounters between planes and wildlife, like migratory birds**. *The Verge*. https://www.theverge.com/2024/4/2/24118846/boston-dynamics-robot-dog-alaska-fairbanks-airport-wildlife

Scholarly Journal Articles

Afzal, N., ur Rehman, M., Seneviratne, L., & Hussain, I. (2024). **The Convergence of AI and animal-inspired robots for ecological conservation**. *Ecological Informatics*, 102950. https://www.sciencedirect.com/science/article/pii/S1574954124004928

Abstract: Augmenting artificial intelligence through the integration of animal-inspired robots holds immense promise for transforming the landscape of ecological conservation. By harnessing the capabilities of AI-driven animal robots, researchers can gain a multifaceted toolkit to explore and understand the behaviors, communication patterns, and ecological roles of various species. These robotic counterparts could serve as invaluable proxies, allowing scientists to observe wildlife in their natural habitats without causing disturbance or altering their behaviors. Furthermore, this approach provides a novel means to study species that are difficult to observe directly, due to their elusive nature or the inaccessibility of their habitats.The collaborative interaction between AI and animal robots opens up avenues for the development of responsive and adaptable conservation strategies. AI algorithms deployed on interactive animal robots can continuously analyze real-time data from the field, allowing for dynamic adjustments in conservation approaches based on emerging patterns and threats. This agility is crucial in addressing the rapidly evolving challenges faced by the ecosystems and species in the wild. In this conceptual review, we discussed here, the opportunities for the fusion of artificial intelligence and animal-inspired robotics to revolutionize our ability to study wildlife and also empower us to implement more effective and sustainable conservation practices. This synergistic approach harnesses the strengths of both technology and biology, marking a significant leap forward in our efforts to protect and preserve the natural world.

Asgharian, P., Panchea, A. M., & Ferland, F. (2022). **A review on the use of mobile service robots in elderly care**. *Robotics, 11*(6), 127. https://www.mdpi.com/2218-6581/11/6/127/pdf

Abstract: Global demographics trend toward an aging population. Hence, there will be an increased social demand for elderly care. Recently, assistive technologies such as service robots have emerged and can help older adults to live independently. This paper reports a review starting from 1999 of the existing mobile service robots used for older adults to grow old at home. We describe each robot from the viewpoint of applications, platforms, and empirical studies. Studies reported that mobile social robots could assist older adults throughout their daily activities such as reminding, household tasks, safety, or health monitoring. Moreover, some of the reported studies indicate that mobile service robots can enhance the well-being of older adults and decrease the workload for their caregivers.

Cao, L. (2024). **AI robots and humanoid AI: Review, perspectives and directions**. *arXiv* preprint arXiv:2405.15775. https://datasciences.org/publication/Humanoid-AI.pdf

Abstract: In the approximately century-long journey of robotics, humanoid robots made their debut around six decades ago. The rapid advancements in generative AI, large language models (LLMs), and large multimodal models (LMMs) have reignited interest in humanoids, steering them towards real-time, interactive, and multimodal designs and applications. This resurgence unveils boundless opportunities for AI robotics and novel applications, paving the way for automated, real-time and humane interactions with humanoid advisers, educators, medical professionals, caregivers, and receptionists. However, while current humanoid robots boast humanlike appearances, they have yet to embody true humaneness, remaining distant from achieving human-like intelligence. In our comprehensive review, we delve into the intricate landscape of AI robotics and AI humanoid robots in particular, exploring the challenges, perspectives and directions in transitioning from human-looking to humane humanoids and fostering human-like robotics. This endeavour synergizes the advancements in LLMs, LMMs, generative AI, and human-level AI with humanoid robotics, omniverse, and decentralized AI, ushering in the era of AI humanoids and humanoid AI.

[UNI only] Chertow, M., Reck, B. K., Wrzesniewski, A., & Calli, B. (2024). **Outlook on the future role of robots and AI in material recovery facilities: Implications for US recycling and the workforce.** *Journal of Cleaner Production, 470*, 143234. https://cvlc-uni.primo.exlibrisgroup.com/permalink/01NRTHIOW_NRTHIOW/1btvbkf/cdi_crossref_primary_10_1016_j_jclepro_2024_143234

Abstract: This study offers a comprehensive discussion of the future role of robots and artificial intelligence (AI) in U.S. recycling under different policy environments and its impact on the workforce. The state of recycling in the U.S. is changing rapidly, with techno-economic developments transforming the efficacy and sustainability of recycling and the workforce it employs. This study describes the technical, social, and policy drivers that influence U.S.

municipal solid waste (MSW) management and explores pathways for more sustainable outcomes by focusing on different technology options for the sorting of recyclables in material recovery facilities (MRFs). This study presents four distinct scenario storylines for U.S. recycling by 2050 that contrast recycling and robotic futures, particularly with MRFs that maximize material recovery, worker experience, and economic competitiveness, respectively. This study finds that a recycling scenario defined by strong policy support for recycling and the addition of increasingly flexible, collaborative technology in the form of robotics coupled with AI-driven vision systems, offers the greatest potential for better results. Less certain is the role of MRFs by 2050 based on the full cost for public actors and substantial changes in private industry. Insights from this study can directly inform future techno-economic analyses, technology decisions, and policy recommendations.

Hilliard, A., Kazim, E., & Ledain, S. (2024). **Are the robots taking over? On AI and perceived existential risk.** *AI and Ethics*, 1-14. https://link.springer.com/article/10.1007/s43681-024-00600-9

Abstract: Artificial intelligence (AI) is increasingly infiltrating our lives, and a large proportion of the population use the technology whether they know it or not. While AI can offer significant transformative benefits, this is only true if it is used in a safe and responsible way with the right guardrails. Indeed, there have been several instances of harm resulting from the use of AI without the appropriate safeguards in place. As such, it is unsurprising that there are mixed views of AI in society, where the negative view can in fact manifest as a dystopian view of “robots taking over”. In this paper, we explore these positive and negative views of AI and the factors driving such perceptions. We propose that negative perceptions of AI often concern job displacement, bias and fairness, and misalignment with human values, while positive perceptions typically focus on specific applications and benefits of AI, such as in scientific research, healthcare, and education. Moreover, we posit that the types of perceptions one has about AI are driven by their proximity to AI, whether general or specific applications of AI are being considered, knowledge of AI, and how it is framed in the media. We end with a framework for reducing threat perceptions of AI, such that the technology can be embraced more confidently in tandem with risk management practices.

Ibuki, T., Ibuki, A., & Nakazawa, E. (2024). **Possibilities and ethical issues of entrusting nursing tasks to robots and artificial intelligence**. *Nursing Ethics, 31*(6), 1010-1020. https://journals.sagepub.com/doi/full/10.1177/09697330221149094

Abstract: In recent years, research in robotics and artificial intelligence (AI) has made rapid progress. It is expected that robots and AI will play a part in the field of nursing and their role might broaden in the future. However, there are areas of nursing practice that cannot or should not be entrusted to robots and AI, because nursing is a highly humane practice, and therefore, there would, perhaps, be some practices that should not be replicated by robots or AI. Therefore, this paper focuses on several ethical concepts (advocacy, accountability, cooperation, and caring) that are considered important in nursing practice, and examines whether it is possible to implement these ethical concepts in robots and AI by analyzing the concepts and the current state of robotics and AI technology. Advocacy: Among the components of advocacy, safeguarding and apprising can be more easily implemented, while elements that require emotional communication with patients, such as valuing and mediating, are difficult to implement. Accountability: Robotic nurses with explainable AI have a certain level of accountability. However, the concept of explanation has problems of infinite regression and attribution of responsibility. Cooperation: If robot nurses are recognized as members of a community, they require the same cooperation as human nurses. Caring: More difficulties are expected in care-receiving than in caregiving. However, the concept of caring itself is ambiguous and should be explored further. Accordingly, our analysis suggests that, although some difficulties can be expected in each of these concepts, it cannot be said that it is impossible to implement them in robots and AI. However, even if it were possible to implement these functions in the future, further study is needed to determine whether such robots or AI should be used for nursing care. In such discussions, it will be necessary to involve not only ethicists and nurses but also an array of society members.

Ihamäki, P., & Heljakka, K. (2024). **Robot pets as “serious toys”-activating social and emotional experiences of elderly people**. *Information Systems Frontiers, 26*(1), 25-39. https://link.springer.com/content/pdf/10.1007/s10796-021-10175-z.pdf

Abstract: When robots are used as part of meaningful play, for example to enhance wellbeing, they can be considered “serious toys”. Our study examines the potential of robotic pet toys viewed as companions, which activate social and emotional experiences of the elderly by increasing their wellbeing. In order to study the benefits of using Golden Pup, a commercial robot dog, we designed and performed a research intervention at a senior day activity center with 10 participants of ages 65–80+ years who were joined by a playful group of preschoolers. In this study, we were mainly interested in the firsthand user experiences.This study suggests how robotic pets can be used to activate the social and emotional experiences of elderly, and illustrated the role of building a relationship with a robotic pet. We present novel results on how a robot dog with a natural interface (NUI) may be used to evoke social and emotional experiences in older adults as part of playful, intergenerational group activities.

Johnston, C. (2022). **Ethical design and use of robotic care of the elderly**. *Journal of Bioethical Inquiry, 19*(1), 11-14. https://link.springer.com/content/pdf/10.1007/s11673-022-10181-z.pdf

Abstract: The Australian Royal Commission into Aged Care Quality and Safety acknowledged understaffing and substandard care in residential aged care and home care services, and recommendations were made that that the Australian Government should promote assistive technology within aged care. Robotic care assistants can provide care and companionship for the elderly—both in their own homes and within health and aged care institutions. Although more research is required into their use, studies indicate benefits, including enabling the elderly to live independently at home, assistance with medication and monitoring of safety. Nevertheless, there are inherent ethical challenges in the use of robots as carers, including loss of privacy, unwarranted restrictions on autonomy, lack of dignity, deception, and the exacerbation of loneliness. Ethics by design can counter these issues in development of robotics and clinical ethics committees have been put forward as a way of dealing with the ethical use of robotic care in healthcare institutions. In this paper I outline the ethical challenges of robotic care assistants and how these may be mediated in their design and use.

Lin, C. S., Kuo, Y. F., & Wang, T. Y. (2024). **Trust and acceptance of AI caregiving robots: The role of ethics and self-efficacy.** *Computers in Human Behavior: Artificial Humans*, 100115. https://www.sciencedirect.com/science/article/pii/S2949882124000756

Abstract: As AI technology rapidly advances, ethical concerns have emerged as a global focus. This study introduces a second-order scale for analyzing AI ethics and proposes a model to examine the intention to use AI caregiving robots. The model incorporates elements from the Unified Theory of Acceptance and Use of Technology (UTAUT)—including social influence and performance expectancy—alongside AI ethics, self-efficacy, and trust in AI. The findings reveal that AI ethics and social influence enhance self-efficacy, which in turn increases trust in AI, performance expectancy, and the intention to use AI caregiving robots. Moreover, trust in AI and performance expectancy directly and positively influence the intention to adopt these robots. By incorporating AI ethics, the model provides a more comprehensive perspective, addressing dimensions often overlooked in conventional models. The proposed model is validated across diverse samples, demonstrating both its theoretical and practical significance in predicting AI usage intentions.

Persson, M., Redmalm, D., & Iversen, C. (2022). **Caregivers' use of robots and their effect on work environment–a scoping review**. *Journal of Technology in Human Services, 40*(3), 251-277. https://www.tandfonline.com/doi/pdf/10.1080/15228835.2021.2000554

Abstract: Despite the lively discussion on the pros and cons of using robots in health care, little is still known about how caregivers are affected when robots are introduced in their work environment. The present scoping review fills this research gap by mapping previous studies about the relation between robots in care and caregivers' working life. The paper is based on searches in four databases for peer-reviewed articles about robots in care settings, published 2000 to 2020. The 27 included papers were examined with the questions of 1) how robots are used by caregivers, and 2) how robots affect caregivers' work environment. The analysis shows that the use of robots can affect both the physical and the psychosocial work environment, in positive as well as in negative ways. Robots are used in care settings to reduce physical and mental demands of the caregivers, but they can, in fact, increase caregivers' workload. Thus, the review indicates that robots can improve the quality of work, but that they seldom work as a shortcut to increased efficiency or time effectiveness.

Salichs, M. A., Castro-González, Á., Salichs, E., Fernández-Rodicio, E., Maroto-Gómez, M., Gamboa-Montero, J. J., ... & Malfaz, M. (2020). **Mini: A new social robot for the elderly**. *International Journal of Social Robotics, 12*, 1231-1249. https://link.springer.com/article/10.1007/s12369-020-00687-0

Abstract: The unceasing aging of the population is leading to new problems in developed countries. Robots represent an opportunity to extend the period of independent living of the elderly as well as to ameliorate their economic burden and social problems. We present a new social robot, Mini, specifically designed to assist and accompany the elderly in their daily life either at home or in a nursing facility. Based on the results of several meetings with experts in this field, we have built a robot able to provide services in the areas of safety, entertainment, personal assistance and stimulation. Mini supports elders and caregivers in cognitive and mental tasks. We present the robot platform and describe the software architecture, particularly focussing on the human–robot interaction. We give in detail how the robot operates and the interrelation of the different modules of the robot in a real use case. In the last part of the paper, we evaluated how users perceive the robot. Participants reported interesting results in terms of usability, appearance, and satisfaction. This paper describes all aspects of the design and development of a new social robot that can be used by other researchers who face the multiple challenges of creating a new robotic platform for older people.

Saputra, F. E., Buhalis, D., Augustyn, M. M., & Marangos, S. (2024). **Anthropomorphism-based artificial intelligence (AI) robots typology in hospitality and tourism**. *Journal of Hospitality and Tourism Technology*. https://eprints.bournemouth.ac.uk/40143/1/BRIAN%20Accepted%20paper%202024-07-08.PDF

Abstract: Anthropomorphism plays a crucial role in the deployment of human-like robots in hospitality and tourism. This study proposes an anthropomorphism-based typology of AI robots, based on robot attributes, usage, function, and application across different operational levels. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) checklist, the research was conducted in two stages. A search strategy was implemented to explore anthropomorphism-based AI robots and to develop a robot typology. This study provides a comprehensive typology of anthropomorphism-based AI robots used in tourism and hospitality and classifies them into four types, namely: chatbots, mechanoids, humanoids, and android robots. Each type features distinct functions and applications. The findings can assist companies in using anthropomorphic robots to improve service and strengthen competitiveness. The study offers valuable insights to managers for deploying AI robots across diverse service sectors. This research provides a novel typology of hospitality and tourism AI robots and extends the understanding of anthropomorphism in human-robot interaction. This typology encompasses both virtual and physical robots, providing clarity on their attributes, usage, functions, and applications across diverse areas of hospitality operations.

Su, J., & Yang, W. (2024). **AI literacy curriculum and its relation to children's perceptions of robots and attitudes towards engineering and science: An intervention study in early childhood education**. *Journal of Computer Assisted Learning, 40*(1), 241-253. https://onlinelibrary.wiley.com/doi/full/10.1111/jcal.12867

Abstract: The number of artificial intelligence (AI) literacy studies in K-12 education has recently increased, with most research focusing on primary and secondary education contexts. Little research focuses on AI literacy programs in early childhood education. The aim of this mixed-methods study is to examine the feasibility of an AI literacy program called “AI4KG” and explore how it might affect kindergarteners' perceptions of robots and attitudes towards engineering and science. A total of 26 child–parent dyads recruited from a Hong Kong kindergarten were involved in this study, consisting of 26 children (Mage = 4 years, SD = 0.28) and their parents. Quantitative and qualitative data were collected through surveys and interviews designed to explore children's perceptions of robots and attitudes towards engineering and science, and parents' perceptions of the AI4KG intervention. It is found that children have increased their perceptions of robots after the AI literacy program, but the AI4KG curriculum had no significant effects on kindergarten children's engineering and science attitudes. Most parents (22 out of 26) agreed that their children's AI knowledge, AI skills, and AI attitudes have been enhanced after learning through the AI4KG curriculum. This study suggests that the AI4KG curriculum is potentially effective in promoting early AI literacy and favourable attitudes towards the technology, but further research is needed to develop age-appropriate measures and assess its long-term impact on children's education and career paths.

van der Burg, S., Giesbers, E., Bogaardt, M. J., Ouweltjes, W., & Lokhorst, K. (2024). **Ethical aspects of AI robots for agri-food; a relational approach based on four case studies.** *AI & Society, 39*(2), 541-555. https://link.springer.com/article/10.1007/s00146-022-01429-8

Abstract: These last years, the development of AI robots for agriculture, livestock farming and food processing industries is rapidly increasing. These robots are expected to help produce and deliver food more efficiently for a growing human population, but they also raise societal and ethical questions. As the type of questions raised by these AI robots in society have been rarely empirically explored, we engaged in four case studies focussing on four types of AI robots for agri-food ‘in the making’: manure collectors, weeding robots, harvesting robots and food processing robots which select and package fruits, vegetables and meats. Based on qualitative interviews with 33 experts engaged in the development or implementation of these four types of robots, this article provides a broad and varied exploration of the values that play a role in their evaluation and the ethical questions that they raise. Compared to the recently published literature reviews mapping the ethical questions related to AI robots in agri-food, we conclude that stakeholders in our case studies primarily adopt a relational perspective to the value of AI robots and to finding a solution to the ethical questions. Building on our findings we suggest it is best to seek a distribution of tasks between human beings and robots in agri-food, which helps to realize the most acceptable, good or just collaboration between them in food production or processing that contributes to realizing societal goals and help to respond to the 21 century challenges.

Wong, K. L. Y., Hung, L., Wong, J., Park, J., Alfares, H., Zhao, Y., ... & Zhao, H. (2024). **Adoption of artificial intelligence–enabled robots in long-term care homes by health care providers: Scoping review.** *JMIR Aging, 7*(1), e55257. https://aging.jmir.org/2024/1/e55257/

Abstract: Long-term care (LTC) homes face the challenges of increasing care needs of residents and a shortage of health care providers. Literature suggests that artificial intelligence (AI)–enabled robots may solve such challenges and support person-centered care. There is a dearth of literature exploring the perspectives of health care providers, which are crucial to implementing AI-enabled robots. This scoping review aims to explore this scant body of literature to answer two questions: (1) what barriers do health care providers perceive in adopting AI-enabled robots in LTC homes? (2) What strategies can be taken to overcome these barriers to the adoption of AI-enabled robots in LTC homes? We are a team consisting of 3 researchers, 2 health care providers, 2 research trainees, and 1 older adult partner with diverse disciplines in nursing, social work, engineering, and medicine. Referring to the Joanna Briggs Institute methodology, our team searched databases (CINAHL, MEDLINE, PsycINFO, Web of Science, ProQuest, and Google Scholar) for peer-reviewed and gray literature, screened the literature, and extracted the data. We analyzed the data as a team. We compared our findings with the Person-Centered Practice Framework and Consolidated Framework for Implementation Research to further our understanding of the findings. This review includes 33 articles that met the inclusion criteria. We identified three barriers to AI-enabled robot adoption: (1) perceived technical complexity and limitation; (2) negative impact, doubted usefulness, and ethical concerns; and (3) resource limitations. Strategies to mitigate these barriers were also explored: (1) accommodate the various needs of residents and health care providers, (2) increase the understanding of the benefits of using robots, (3) review and overcome the safety issues, and (4) boost interest in the use of robots and provide training. Previous literature suggested using AI-enabled robots to resolve the challenges of increasing care needs and staff shortages in LTC. Yet, our findings show that health care providers might not use robots because of different considerations. The implication is that the voices of health care providers need to be included in using robots.

Websites

Kumar, Nishanth J. (2024, May 28). **Will Scaling Solve Robotics? The idea of solving the biggest robotics challenges by training large models is sparking debate**. *IEEE Spectrum*. https://spectrum.ieee.org/solve-robotics

Abstract: Is training a large neural network on a very large dataset a feasible way to solve robotics? Of course, some version of this question has been on researchers' minds for a few years now. However, in the aftermath of the unprecedented success of ChatGPT and other large-scale "foundation models" on tasks that were thought to be unsolvable just a few years ago, the question was especially topical at this year's CoRL. Developing a general-purpose robot, one that can competently and robustly execute a wide variety of tasks of interest in any home or office environment that humans can, has been perhaps the holy grail of robotics since the inception of the field. And given the recent progress of foundation models, it seems possible that scaling existing network architectures by training them on very large datasets might actually be the key to that grail.