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A NAO Robot Performing Religious Practices[1]

1. Introduction

The connection between religion and technology is not entirely new to us: there have already been prayer apps, digital Bibles, and religious texts online for a long time, we stream religious ceremonies, and religious communities have been online on platforms and social networks for quite a while. Now, Religious Tech is booming, thanks to advances in generative AI and much more. Technologies now have access to ChatGPT, we can utilise Augmented Reality (AR) and Virtual Reality (VR) and some churches are employing AI for services. Virtual Masses are being celebrated on the gaming platform Roblox,[2] digital avatars of religious figures are being created (e.g., the recently developed Luther avatar), and then there are also religious robots. Religious robots can accompany prayer or religious ceremonies, engage in religious conversations, and address the spiritual and existential questions of the believers. It is important to note that the discussion around religious robots is not concerned with whether they are religious, possess souls, or can pray. It solely revolves around the practices and functions that they perform.

For various reasons, religion is particularly well-suited to engage with robotics. For instance, religion provides a rich array of examples of specific forms of relationships with non-human entities, such as animals and hybrid creatures in the Bible. Moreover, the process of technologization raises numerous anthropological and ethical questions about the conception of human beings and the world. Technological advancement challenges many traditional perspectives on humanity. Religion offers a comprehensive repertoire of responses to anthropological and ethical questions. Furthermore, religions address social and spiritual needs, existential queries, and significant life stages of individuals, which can enrich human-robot interaction.

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[2] See Mauro 2023. For the reference to Roblox, I am grateful to Kamil Mamak.

This article deals with the NAO robot, which is "one of the most popular humanoid robots in the world" and a social robot that is widely used in education, research, and healthcare (Robaczewski et al. 2020). In this article, I present my study in which I deploy a NAO robot in a religious context, namely the Katholikentag 2024 in Erfurt, Germany, to explore its applications. While robot ethics has remained largely secular to date, this research investigates religious perspectives and practices for robots to diversify the discourse.

Parts of my research on religious robots have already been published in Puzio 2023a, b and are revisited here. In Sect. 2, I will introduce what religious robots are and present examples of such robots. Then, in Sect. 3, I will discuss my project with a NAO robot at the Katholikentag. In Sect. 4, I will discuss anthropological and ethical questions related to religious robots. Thus, I will outline the direction in which research on religious robots can go, where the challenges lie, and highlight two key advantages. Finally, in Sect. 5, I conclude with an outlook for future research on religious robots.

2. New Frontiers in Religious Tech: Religious Robots

Robots are being developed for many different areas of life: there are service robots, medical robots, household robots, sex robots, transport robots, exploration robots, industrial robots, military robots, and many more. In comparison to these other robots, religious robots are still in the early stages of development and are not as advanced as many other robots (Balle 2022).

Amongst the religious robots, two groups can be distinguished: first, there are robots, which serve specifically religious purposes. These robots are used exclusively in religious settings or for religious ceremonies. Examples include BlessU-2, Celeste, and SanTO, which are designed only for religious interactions. The second group comprises robots that may possess religious functions, but this is not their primary purpose for development. These robots are predominantly "social robots". Social robots are designed for social interaction, and are used for human–robot interaction in, for example, hospitals, care facilities, or education (Nyholm et al. 2023). Many social robots aim to replicate and enhance specific human activities through their unique modes of human-robot interaction, communication, affectivity and emotional response; for instance, they can assist in therapy or improve learning outcomes. When religious functions are integrated into social robots, the capabilities and purposes of these robots can be broadened: religious robots used in education can teach about religion, and robots in hospitals can discuss not only secular topics with patients but also accompany them in their prayers. Examples of such robots include the popular Pepper and NAO robots.

BlessU-2, a German robot, delivers blessings in various languages (Löffler et al. 2021). SanTO (the Sanctified Theomorphic Operator) (Trovato et al. 2019) takes on the appearance of a Christian Catholic saint and recites sacred texts while accompanying the faithful in prayer. It also serves as a companion with psychological functions, contributing to the well-being of individuals, particularly the elderly (Löffler et al. 2021; Trovato et al. 2021). Celeste, resembling a Catholic angel, provides spiritual guidance through prayer and prints personalized Bible verses. In the Great Mosque of Mecca (Masjid al-Haram), Islam employs robots to assist pilgrims, provide guidance on rituals, for disinfection, and offer information on Islamic teachings (SPA 2024; WION 2023)[3]. Meanwhile, Mindar, a robot priest in Japan, embodies the Buddhist teacher, Kannon Bodhisattva, and conducts Zen ceremonies at the temple (Smith 2022; Klein 2019). The monk robot, Xi'aner, follows visitors around the temple, responds to their inquiries about Buddhism and plays Buddhist music. It is also available as a chatbot, with which you can communicate over online messenger services. Xi'aner is designed with the purpose of promoting Buddhism in China (Trovato et al. 2021; Löffler et al. 2021). Moreover, in Japan, the humanoid robot Pepper is utilized in Buddhist funerals because it is cheaper than a human priest. It also broadcasts the ceremony over the internet for those who are unable to attend (Löffler et al. 2021).[4]

Although there are robots for various religions being utilized in different countries, it is noticeable that the acceptance of robots varies significantly among cultures, countries, and religions. Comparatively, Hinduism, Taoism, Confucianism, Shintoism, and Buddhism tend to be more receptive and open towards religious robotics than the monotheistic religions (Trovato et al. 2021). In Hinduism, this alignment is facilitated by the worship of multiple deities or in diverse forms, encompassing concepts of reincarnation and the sacred character of animals and other entities (Trovato et al. 2021). Buddhism explores the attribution of Buddhahood to robots, and Shinto-inspired techno-animism, which does not separate matter and spirit, can perceive robots as animated (Jecker/Nakazawa 2022; Jensen/Blok 2013; Kasulis 2019; Trovato et al. 2021; Geraci 2013).

The attitude towards (religious) robots is intertwined with different concepts and ideas, including life and aliveness, the distinction between animate and inanimate, nature and culture, and the relationship with non-human entities and objects. These notions are not fixed but rather culturally negotiated and subject to change over the course of history (Puzio 2023b, c). Currently, within Christianity, a predominant technological scepticism prevails, resulting in the rejection of religious robotics. As robots become increasingly integrated into

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[3] I thank Samantha-Kaye Johnston for this reading suggestion.
[4] For a perspective from Confucianism, see Kim and Strudler (2023).

various aspects of work and daily life, and as we develop more profound inter-actions and relationships with them, it is plausible that our attitude towards religious robotics will also undergo transformation.[5]

3. A Preview: A NAO Robot Performing Religious Practices

NAO is a humanoid robot, developed by Aldebaran Robotics (now part of SoftBank Robotics) and introduced to the market in 2007.[6] The latest version is NAO 6 from 2018. It stands 58 cm tall, connects via WiFi, has a battery life of approximately 60-90 minutes, and can be programmed openly. According to the website, there are 5,000 NAO robots in use across more than 70 countries (Aldebaran n.d.).

NAO falls into the second category of robots presented above as a social robot, primarily designed for social interactions. It is equipped with two 2D cameras, directional microphones and speakers, and tactile sensors, which allow it to move and adapt to the environment. Robaczewski et al. (2020) provide a review of all the cases for which NAO is currently being used: for example, for promo-tion and advertising, as a companion, for education and coaching, in psycho-logical and physical therapy. It can model movements, assist in rehabilitation, play, dance with users, train, motivate, or reduce stress. It shows promising effects in autism spectrum disorder (ASD) and dementia (ibid.). In Robaczewski et al.'s paper from 2020, there is no mention of NAO being used in a religious context.

In May 2024, I will deploy the NAO robot at the 103rd Katholikentag in Erfurt, Germany, a significant religious and Catholic event organized by the Central Committee of German Catholics (Zentralkomitee der deutschen Katho-liken, ZdK) and the Diocese of Erfurt (Bistum Erfurt). This event spans five days and includes 500 activities, featuring a diverse array of formats such as services, political panels, workshops, and exhibitions. Topics range from digitisation, spirit-uality, interreligious dialogues, LGBTQIA+ issues, to culture, covering not only religious themes but also a wide spectrum of current political and societal issues (Katholikentag 2023/2024a, b). Given the still close ties between the church and society/politics in Germany, it is an influential, socially impactful event.[7] Up to 20,000 participants are expected (Katholikentag 2023). Attendees of the Katholikentag are primarily religious individuals or at least those with a religious

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[5] Parts of this section have already been published in Puzio 2023a, b and are revisited here.

[6] For further information about the Nao robot, see the company's websites: Aldebaran (n.d.), SoftBank Robotics (n.d.).

[7] However, it is also necessary to mention the high number of departures from the Catholic Church and the declining significance of Catholicism in Germany.

interest, mostly Christians, particularly from the Catholic Church[8], which in 2022 constituted 24.8 percent of the population in Germany (DBK 2023). As a member of the "Digitisation" working group (Arbeitskreis Digitalisierung) appointed by the ZdK and the Diocese of Erfurt, I will conduct workshops with the NAO robot.[9] I will present the NAO robot to an audience that, while interested in robots, largely lacks experience with them, and I will explain, test, and explore its use with the audience.

When deploying the NAO robot at the Katholikentag, it will thus be possible to explore the use of the NAO robot for religious practices and its interaction with religious individuals. Having a background in both Catholic theology and philosophy, I will attempt to merge these perspectives. While the ethics of robots has been well-researched for many years, with handbooks, overview literature and introductions already available (Van Wynsberghe 2016; Coeckelbergh 2022; Nyholm 2020; Nyholm et al. 2023; Lin et al. 2012; Lin et al. 2017), the topic of religious robotics remains neglected. Relevant questions include: do religious individuals face different anthropological and ethical questions in the context of robotics compared to non-religious people? Or do they answer them differently? How does human-robot interaction differ between religious and non-religious individuals? Can people have religious experiences with social robots, and is it conceivable to increasingly use robots for religious practices in the future? How do religious individuals react when robots address religious themes or perform religious practices? Although, as mentioned above, there are already first examples of religious robots, these questions remain unexplored or inadequately researched. Furthermore, empirical studies and ethical research on the robots mentioned above are still insufficient.

What potential uses does the NAO have as a religious robot? Studies (on non-religious robots) have demonstrated that social robots can offer significant support in healthcare, therapy, and caregiving, notably for dementia (Robaczewski et al. 2020) and Autism Spectrum Condition (Darling 2021). Kate Darling provides a poignant example of a child with autism who, after years of therapy with only minimal interaction with their therapist, began to engage in conversation and interaction with a robot. This highlights the unique form of communication, interaction, and relationships with robots, introducing new avenues for therapeutic interventions (ibid.). Furthermore, social robots are increasingly being designed and deployed in hospitals to enhance patient experiences. For example, the teddy bear-shaped robot, Huggable, is used to accompany children during their hospital stays, delivering medications and injections in a playful manner (MIT 2010–2017; Logan et al. 2019; Matheson 2019; Smith 2022).

[8] Nevertheless, the Katholikentag welcomes all people, regardless of their religion.
[9] The robot is on loan from the University of Twente – thank you very much.

In the context of hospitals and nursing homes, many questions related to religion, spirituality, life, life decisions, and existential inquiries arise. Furthermore, religious practices and conversations can contribute to improving people's well-being, making them feel safe and heard, providing hope, and reducing their stress.

In addition to their deployment in hospitals and care settings, social robots can serve educational purposes. They can be utilised for enhancing learning (Leyzberg et al. 2018; Ackerman 2015; Tanaka et al. 2012), boosting motivation (Robaczewski et al. 2020), and developing certain skills in children, such as creativity (Elgarf et al. 2022). By incorporating religious functions into these social robots, it becomes feasible for robots to disseminate religious content and provide information about various religions. They can offer engaging and personalised ways to learn about religious teachings and beliefs. If robots are employed for teaching in schools, religious education could also be integrated into their teaching curriculum (Alemi et al. 2020).

4. Anthropological and Ethical Questions

Finally, I would like to draw attention to the anthropological and ethical questions that arise in the context of religious robots. The anthropology of technology reflects on the human being within the framework of technology. In particular, humanoid robots prompt us to revisit the foundational question of what it means to be human. What distinguishes humans from robots? Which capabilities are unique to humans? Can robots exhibit consciousness or intelligence? Our understanding of what it means to be human evolves over time and is always in relation to the non-human. Thus, in observing and interacting with robots, we are prompted to reflect anew on what constitutes being human, encompassing emotions, social behaviour, sentience, and intelligence (Puzio 2023c). In theological anthropology and religious conceptions of humanity, aspects such as the soul, relationality to God and fellow humans, creation, freedom, vulnerability, the concept and doctrine of imago Dei, and salvation play significant roles. Therefore, the questions that are more pronounced in a religious context than in a non-religious one include, for example: can robots have a soul?[10] Are robots part of creation? Can they also be considered as imago Dei (O'Donnell 2018; Thweatt-Bates 2016; Herzfeld 2002; Puzio 2023c), or how do they impact our understanding of imago Dei and our relationships? It is also crucial to discern which of these theological questions are truly relevant and

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[10] On the topic of robot souls, see Poole 2023.

which are more speculative, potentially distracting us from the real issues that arise in human-robot interaction.[11]

Besides the need for orientation and the comparison between humans and technology, anthropology engages with conceptions of the human being that are embedded within technology. Technologies such as robots and medical technologies already embody certain conceptions of humanity and may contain discriminatory, ableist, sexist, and racist assumptions, which can be identified and critically examined. Who is being overlooked? Religions often advocate for marginalised groups and are known for their charitable activities – Christianity in Germany, for instance, continues to play a significant role in charitable activities (e.g., "Caritas"), in healthcare and hospitals, and in education from primary schools to adult education ("Katholische Erwachsenenbildung"). Thus, Christianity could play a crucial role in highlighting the groups and individuals who are not heard and who are further marginalised and discriminated against by technologies. However, Christianity itself harbours many discriminatory structures, such as discrimination against women and racism, which could be perpetuated by robots. Would a robot's designed gender affect the ceremonies and activities it can perform? Many roles within the Catholic Church are reserved exclusively for men. Is there sufficient engagement with the issue of racism reproduced in robots, especially when such issues are already insufficiently addressed within religion outside the realm of robotics?

Here, it is evident that anthropology is closely linked with ethics. In the context of religious robots, questions of robot ethics emerge anew, involving issues such as autonomy and responsibility, deception and manipulation, design ethics, discrimination, and diversity. Elsewhere (Puzio 2023a, b), I have discussed these aspects of the ethics of religious robots in detail. Other questions and objections that I have also discussed (and in some cases refuted) include the widespread objection that robots lack essential human characteristics (a sort of "properties-approach" (Coeckelbergh 2012; Gunkel 2018) for religious robots) and that they cannot have their own religious experiences. It will be important to research whether and for what exact purposes religious robots should be used, and for what they should not. The environmental impacts of religious robots also need to be considered, necessitating a thorough evaluation of the development and deployment of religious robots. Moreover, for Catholic theology, the relationships are of particular interest. We see that people develop close relationships with robots and become quickly attached to them. Kate Darling (2021) compares this to our relationships with animals. This even extends to the point where there are funerals for robots, such as for the robotic dog Aibo.

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[11] For further reading on this topic, see also Baumstieger/Kreye (2023).

What advantages could arise from the use of religious robots? The diverse personalised and anonymised services that robots offer present various applications and benefits. I would like to highlight two key advantages that I have previously suggested (Puzio 2023a) and that need to be explored through studies:

A crucial advantage of religious robots is their potential to enhance inclusivity in religious practices. Integrating chat functionalities, streaming capabilities, and virtual reality/augmented reality features makes religious participation accessible to individuals who may be confined to their homes, care facilities, or hospitals due to illness or other limitations. Often, individuals wish to bid farewell to their loved ones at funerals, but in some cases, they may not be able to physically attend. Virtual/augmented reality technologies and other specialised equipment enable those unable to participate in religious ceremonies in person to touch religious objects and experience haptic and olfactory sensations. This technology can also provide special access to religious events for people with disabilities, including assistance in facilitating certain movements. Beyond offering physical assistance, it supports visualization and language, enabling participation in multiple languages or providing non-linguistic access.[12]

My central argument is that religious robots offer something that, so far, other robots cannot: engagement with existential questions and spiritual needs. Especially during hospital stays, patients often confront existential, religious, and spiritual questions. With the increasing deployment of the aforementioned social robots in medical settings, the crucial question emerges: should these robots remain atheistic or agnostic, or should they be intentionally designed to cater for patients' religious needs? Religious robots could be uniquely positioned to occupy a niche in social robotics by addressing existential queries and spiritual themes. Such questions and concerns relate to one's own life and identity, the meaning of life, the afterlife, the reasons for suffering, the exploration of inner thoughts and feelings, the contemplation of transcendent realities, meditation, and spiritual practices. These profound topics have not yet been sufficiently addressed in the domain of social robotics.

5. Outlook

Should social robots remain agnostic/atheistic or address religious themes? As demonstrated above, integrating religious perspectives into robotics and the

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[12] It must also be noted that many limitations actually become such only through society's perception of them and its interactions with them, thereby underscoring that these issues cannot be resolved purely through technological means. Moreover, efforts should be sustained to include all individuals in religious practices to the fullest extent possible, rather than offering certain individuals merely a secondary form of participation, such as virtual access, facilitated by technology.

use of religious robots can enrich current robotics as well as religious communities and practices. At the same time, they come with ethical challenges that must be taken into account. Therefore, the focus of future research should be on responsibly shaping technology and robotics. It remains to be determined and shaped how this technology should be utilised, which specific tasks religious robots should undertake, and which they should not. This will require keeping in mind the dual perspective of opportunities and challenges.

Crucially, it is important to focus on the individual subjective experiences that people have with religious robots and to base further ethical considerations regarding religious robots on these experiences. Much more empirical research is needed on how people interact with religious robots, how they perceive them, what their thoughts and feelings are, where they see the benefits, and where they have fears or personal boundaries. With this study, involving the Nao robot at the Katholikentag, I aim to contribute to this area.

Moreover, it is crucial to integrate theological perspectives and concepts into the discourse, such as reflections on the relationship to nature, concepts of life, the image of God, creation, reincarnation, and the soul. On the other hand, it is noticeable that the discourse on technology already features various religious motifs, including ideas of salvation, paradise, omnipotence, omniscience, the aim of reducing suffering, and the concept of creation. This infusion of religious motifs into the technological discourse warrants scrutiny and analysis from a religious studies perspective.

How does the discourse on robots change when expanded to include religious perspectives and practices? Incorporating religious viewpoints is vital to diversify the current discourse on robots.

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