THE INTERACTION OF RELIGION AND ROBOTICS AND AL-SĀMİRĪ'S CALF (THE GOLDEN CALF) AS AN EARLY THEOMORPHIC ROBOT

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Abstract

The interaction between technology and religion has led to discussions on social robots in religious studies. Various robots have been produced to conduct funerals, give blessings, respond to personal prayer requests, preach, answer religious questions, or instruct religious education. Parallel to these developments, the term theomorphic robot was introduced to describe robots employed for religious purposes, and the characteristics of this type of robot have been described. Attitudes toward technological advances have been influenced by the religious or cultural origins of individuals and society. The present study investigates the "calf", called "The Story of

al-Sāmirī" in Islam and the "Golden calf" in Judaism, in terms of theomorphic robot design and features and discusses whether the "calf" can be considered an early theomorphic robot. It is concluded that the "calf" can be considered an example of an early theomorphic robot in terms of most of its features, and the Story of al-Sāmirī can be employed as a criterion for theomorphic robot analysis. This can explain the interaction between religion and robotics in Muslim culture. Attitudes toward the interaction of religion and robotics vary based on the description and perception of theomorphic robots.

Keywords: Psychology of religion, social robot, theomorphic robot, human-robot interaction, religion-robotics interaction

Introduction

Artificial intelligence has entered our daily lives, especially in the last two decades. It has transformed and continues to transform business models in several industries, especially finance, education, and health (Brynjolfsson - McAfee, 2019). Religious services were not initially included among the industries transformed by artificial intelligence applications. Technology and religion are perceived as opposite poles, and they have even been considered archenemies. Historically, however, religious-spiritual life has changed due to technological advances, and there has been an interaction between technology and religion. The increase in the number of communication channels and the rise of digitalization have affected personal perceptions of religion, spirituality, and religious rituals. Chats conducted by clergy are available as online videos, technological devices such as microphones and projection devices are employed in places of worship, and virtual pilgrimages are conducted. LED candles are used in churches, pens can read the Qurʾān, "zikirmatik" (an instrument that counts dhikr) is used to replace the rosary, mobile religious applications have been produced, and prayer rugs that instruct prayers and other religious practices are available. Doğan (2018, 84) proposed the concept of "techno-religiosity" with reference to technological worship applications and suggested that religious technologies improve the connection with the sacred in daily life. Haji Mohamad (2017, 4918) reported that technologies lead to personal religious performances instead of mass interaction on digital/online

channels and coined the concept of "techno-religious space". Kimura (2017, 17-18) emphasized that advances in artificial intelligence and robotics have changed religious lifestyles, and new definitions of religiosity and spirituality should be discussed in the sociology of religions. In recent years, social robots, called theomorphic robots, have begun to be employed in religion (Trovato et al., 2016), and studies have described their properties. The present study aims to investigate al-Sāmirī's calf, an ancient story, in terms of the features of theomorphic robots and to discuss the possible attitudes of Muslims toward theomorphic robots based on the story of al-Sāmirī.

Prior to any analysis or discussion, questions such as "What is a robot?" and "What distinguishes a robot from any other machine?" should be answered. However, answering these questions is no small task. Several studies have indicated the slippery, flexible, and difficult nature of defining a robot (Branwyn, 2004; Ben Ari - Mondada, 2017; Mayor, 2018; European Parliament, 2017). Siciliano and Khatib (2019, 3-8) referred to the "idea of robots" that prevailed from ancient Egyptian and Greek mythologies to al-Jazarī and Da Vinci and argued that the concept of robots has gradually developed throughout history, while Mataric (2007) reported that the definition of robots has changed over time due to technological advances. Despite the abovementioned contradictions, it is still possible to study initial definitions and examples of modern robotics. As indicated by Mayor (2018, 4), although historians have dated the idea of robots to the Middle Ages when self-propelled devices first appeared, the idea of "artificial life" precedes technological reality and goes back thousands of years. Mayor (2018, 2) considered the principle "not born, made" an important distinction. According to Mayor, the difference between "manufactured/made" and "biologically born is the boundary between human and nonhuman and between natural and unnatural. Thus, it could be suggested that manufactured items that exhibit vitality reflect the idea of a "robot". Mayor (2018, 221) considered the moving mythological statue of Talos an adequate definition of a modern robot. Thus, al-Sāmirī's calf could also be considered an early "robot" since a) it had a physical body (made of metal), b) it exhibited vitality (it bellowed), and c) it was designed and produced by a human (al-Sāmirī).

The chain of events known as "The Story of al-Sāmirī" among Muslims and the "Golden calf" incident in Jewish sources is described in detail in the Qurʾān. The event is also mentioned in the Torah with certain differences. Both scriptures state that the Israelites worshipped the calf. However, although not mentioned in the Torah, the "bellowing" of the calf is particularly emphasized in the Qurʾān. The current study is based on the Qurʾānic narrative of the Golden calf to suggest that al-Sāmirī's calf could be one of the early examples of theomorphic robots. We also discuss whether the Muslim approach to the religion-robotics interaction could serve as a criterion for the analysis of theomorphic robotics based on the story of al-Sāmirī.

The current study is based on the Qurʾān and related commentaries in addition to the texts of different faiths. This is necessary to understand the attitudes of Muslim society toward the interaction of religion and robotics. However, the fact that referenced texts are only a small part of studies on the story of al-Sāmirī could be considered a limitation of the study. Furthermore, a comprehensive comparison of anthropological, mythological, and archaeological sources and religious texts is required to detail the historical reality of the story. Despite these limitations, we hope that the present study will contribute to the future attitudes of Muslim societies toward the religion-robotics interaction and experts' discussions on the regulation of this interaction.

1. The Religion-Robotics Interaction

Developments in robotics have changed the dimensions of the interaction between religion and technology. The use of robots not only in factories but also in spaces of human interaction and the concept of "social robots" that can establish meaningful social interactions with humans have become significant (Breazal, 2003; Duffy, 2003). Social robots, which are especially popular in the service industry, have recently started to penetrate religious activities. A workshop was organized at the International Congress of Social Robotics (ICSR 2017) held in Japan in 2017 on Embodied Interactive Robots, "Religion in Robotics", moderated by Trovato, Cuellar, and Huerta-Mercado (Kheddar et al. [ed.], 2017). Later, a workshop on "Robots in Religious Contexts" was organized in the Robo-philosophy Conference Series in 2020 and moderated by Balle and Ess. In 2021,

the International Journal of Social Robotics published a special issue on 'Religion in Robotics' (Trovato et al., 2021a).

Issues such as the reflection of the human desire to create artificial life in science and religion (Geraci, 2007, 976), the development of spiritual machines (Kurzweil, 1999), and theological analysis of robots (Midson, 2017) have been discussed in the literature. Geraci (2007, 961) reported the similarity between Rudolf Otto's (1936) explanation of the coexistence of fascination and trembling in sacred experiences and artificial intelligence applications. Geraci (2007) empirically demonstrated the hypothesis that individuals feel fear and fascination about technological advances and claimed that people have elevated smart machines to divine status and deified machines in many respects.

In addition to theoretical discussion, the increased use of robots in daily life has led to studies on attitudes toward robots. These studies suggest that culture is one of the factors that determines these attitudes, and religion, an important element of culture, is also effective (Bartneck et al., 2005; Kaplan, 2004; Korn et al., 2021; Trovato et al., 2013; Złotowski et al., 2020). Personal reactions to social robots are influenced by an individual's culture and beliefs. Kaplan (2004, 465, 470), in an article that evaluated the acceptance of robots based on cultural differences, emphasized that the lack of clearly defined Western or Japanese cultures and the differences between these cultures make systemic comparisons difficult. In Japanese culture, the distinction between the natural and the anthropogenic is blurred due to the prevalence of Shintoism and Buddhism, and the imitation of nature is associated with respect. Mori (1989) argued that robots possess the nature of Buddha and the potential to achieve Buddhahood. In contrast, Kaplan (2004, 471) argued that the natural and cultural are distinct in the West and require a clear idea about these distinctions. Furthermore, this difference between the natural and the artificial is effective in the Western approach to machines and robots. Similarly, Geraci (2006, 235-240) argued that research paradigms are influenced by religion in an article that analyzed the development of robotics and artificial intelligence in the USA and Japan with a cross-cultural approach. Geraci claimed that Shintoism and the Buddhist approach to the universe and humans play complementary roles in the development of the Japanese robot industry. Löffler et al. (2019, 571) reported that a critical view of technology was developed by

Christianity and claimed that technology alienates individuals from themselves and nature in Christian theology. Shaw-Garlock (2009, 253-257) indicated that there is no belief that inanimate objects can have spirits in Western Judeo-Christian culture, and Western popular culture harbors the cultural fear of losing control of robots. Geraci (2006, 240), in contrast, indicated that the hope of salvation of extraterrestrial transcendent bodies, a cosmic goal, and the expectations of Christians allow them to prioritize artificial intelligence rather than humanoid robots. In Judaic ethics, the approach to new technological advances is cautious but optimistic (Rappaport, 2006, 9), and a study has discussed whether acts that are prohibited on Shabbat could be performed by robots (Wecker - Lavee, 2020, 19). Trovato et al. (2021b, 542-543) developed the concept of theomorphic robots and argued that the most important issue in Islam regarding humanoid robots is intolerance of the depiction of images of living beings. Trovato et al. argued that the hadith by the Prophet that "Angels do not enter the house where images are depicted." (al-Bukhārī, "Badʾ al-khalq", 6) has a negative effect on the acceptance of humanoid robots (Trovato et al., 2021b). However, it is not a painting, image, or sculpture that is prohibited in Islam but the potential to turn these objects into an instrument of worship by attributing divinity (Sipahi, 2018, 537), and sensitivity toward preventing idolatry has been developed (Keskinoğlu, 1961, 14). Islamic law argues that technology itself is not good or bad, but its consequences could be, and these developments should not cause harm (Görgülü - Kesgin, 2021). Furthermore, it is not considered adequate to attribute morality and legality to robots based on an ontological analysis (Gezer, 2022; Görgülü - Kesgin, 2021). Based on the literature, the number of studies on the interaction between robotics and religion in various belief systems has increased in recent years (Ahmed - La, 2021; Baffelli, 2021; Cheong, 2020; Ess, 2020; McBride, 2015, 2019; Midson, 2022; Weng et al., 2019). Katz et al. (2015, 35) argued that the literature on the acceptance of robots focuses on Judeo-Christian, Shinto, and Buddhist traditions and emphasized that belief systems such as Islam and Hinduism have been neglected. Thus, these authors suggested further investigation of the role of religion and religiosity in attitudes toward robots.

McBride (2015, 26) argued that service robots will be programmed based on Islamic, Catholic, Mormon, and other beliefs. For example,

as the popularity of childcare robots increases, parents begin to expect these robots to teach their children right and wrong and ethical values based on their religious conventions. Ahmed and La (2021, 228-229) suggested that religious robots could be used a) to instruct basic religious teachings, b) to communicate religious texts to people in religious counseling, and c) to perform daily religious services. They argued that robots can play roles as religious assistants in congregations and d) as home robots that provide both friendship and religious instruction. Certain applications play these roles in different belief systems.

1.1. Religious Use of Social Robots

An early example of a religious robot was the Mechanical Monk. The Mechanical Monk was produced as an offering for King Philip II in exchange for the healing of his son. It was reported to have been built by Juanelo Turriana, a famous clock and vending machine manufacturer in the 16th century. The 15-inch-high monk is known for its mechanical sophistication. It held a cross in one hand and a rosary in the other, moving automatically once wound. It could move its arms, turn its head, walk, bring the cross to its lips and kiss it, and open its mouth (King, 2002). According to King, the Church did not approve of the Mechanical Monk and considered its maker a magician, and the automaton was perceived as uncanny since it obscured the distinction between the animate and inanimate. Over time, similar social robots have been produced. Especially since 2010, social robots with different functions have been designed and used by Buddhists, Christians, and Muslims.

The Buddhist robot Pepper, designed to administer funeral services, is a semi-humanoid robot that has been mass-marketed in Japan since 2015 (Travagnin, 2022, 138). The 120-cm robot wears a Buddhist robe. Pepper sings sacred texts called Sutras as it beats a drum. In rural areas without access to religious officials or budgets, the Buddhist robot priest serves the community (Reuters, 2017). Pepper can also broadcast funerals for those who cannot attend.

Another example is the approximately 60-cm tactile humanoid robot Xian'er, which has artificial intelligence and can answer questions about Buddhism. Originally developed as an animated character, the first physical version of Xian'er that included a touchscreen on its chest was introduced in 2015. It is tactile, can move,

and has lighting. An internet-based messaging application was developed for Xian'er. It can answer questions on Buddhism or daily life, discuss, joke, and lead meditation face-to-face or via a messaging app. Xian'er has increased the number of people attending monastery services (Travagnin, 2020).

Another Buddhist social robot is Mindar. Mindar is a manifestation of the Buddhist Goddess of Mercy, Kannon Bodhisattva, and was introduced in 2019. Located in the gardens of the famous 400-year-old Kodaji Temple in Kyoto, Japan, Mindar performs Buddhist prayers and rituals. It is an anthropogenic robot with a metallic body and a silicone-coated face, neck, and hands. Mindar is 195 cm high and can move, speak, record video, and preach (Loewen-Colón - Mosurinjohn, 2022). Temple priests pray and prostrate in front of Mindar, and holy properties are attributed to the robot. Thus, Mindar's role is different from previous examples; it is believed that it embodies the spirit of Kannon Bodhisattva, creating certain emotional reactions in the audience (Baffelli, 2021, 253). Like Xian'er, Mindar was designed to attract new faithful to Buddhism, especially younger individuals.

Another robot developed for the Buddhist faith is DarumaTo. Daruma wish dolls, popular in China and Japan, are believed to bring luck in Buddhism. They represent Bodhidharma, known as the founder of Zen Buddhism. The DarumaTo (Daruma Theomorphic Operator) was developed due to the popularity of Daruma dolls in Buddhist culture, especially among elderly people (Trovato, 2019a). The robot can support elderly care and health care. It was designed based on the skeuomorphism concept, a design approach that prioritizes the essence of the object, to preserve the basic appearance of the Daruma dolls. DarumaTo includes a digital screen on the front that displays facial expressions and nods. It can follow the human face, communicate verbally, and allow users to play various games that support cognitive activities. In a preliminary study conducted after the development of DarumaTo, the interaction of the robot with elderly people was verified, and it was observed that its familiarity was beneficial when compared to then-current robots. Although DarumaTo was inspired by a divine object, it also has nonreligious functions.

One of the first Christian robots was BlessU-2. It was introduced as an art installation in an exhibition in Germany in 2017 to celebrate the

500th anniversary of the Protestant Reformation (Sherwood, 2017). Developed as an experimental artwork, the robot priest called BlessU-2 is 180 cm high and has a head, two movable arms, eyeballs and eyebrows, a mouth, and a digital display. Visitors interact with BlessU-2 via the touch screen on its chest, where language and gender preferences are selected. Ultimately, the algorithm selects a verse based on these preferences, and the robot sings the verse in the preferred language and gender. The robot priest accompanies the song by raising its arms, moving its eyebrows and eyes, and emitting lights. The whole process takes approximately one minute. This blessing robot was covered significantly in the press in 2017, and over 10,000 people visited it. 1923 volunteer visitors provided anonymous views on their experiences with the robot. The analysis of visitor feedback revealed that half of the comments were positive (51%), one-third were neutral (29%), and one-fifth were negative (20%). The views were concentrated on the robot's appearance, behavior, functions, scenarios, and experience (Löffler, 2019, 575-576). According to media reports, street interviews revealed that people were curious about the robot, while religious people were more critical (Sherwood, 2017).

SanTo was developed by Trovato et al. (2018b) for Catholics in 2018 as a sacred robot for research. SanTo was inspired by sacred art and looks like Catholic saints. It is a domestic robot that imitates the body of a saint, including a niche and a candle. The robot can turn toward the user by sensing the face with a camera. The candle and the niche include LED lights, and the arms and hands include tactile sensors. The robot cites Bible verses and stories about the saints (Trovato et al., 2018b). SanTo was tested with 30 individuals in a church in Peru. The findings revealed that the interactions were successful, and SanTo was considered sacred like other minor saint figurines (Trovato et al., 2019b). In addition to the religious context, it was designed as a psychosocial companion, especially for elderly individuals.

Robots and automats have also been used in Islam. Al-Jazarī, born in 1136, played a key role in the history of technology in Islam. Al-Jazarī developed several automats, such as clocks, water mills, and fountains, and published these works in the illustrated *Kitāb fī maʿrifat al-ḥiyal al-handasiyyah* (Book of Knowledge of Ingenious Mechanical Devices), which was translated into several languages. One of the automats developed by al-Jazarī was for the ablution ritual,

and automats included a peacock that dispensed water through its beak. As the water flew, a child figure holding soap came out of a door, and another holding a towel came out of another door when the water flow stopped (al-Jazarī, 2002). Al-Jazarī is known as the founder of cybernetics.

A recent example of robots in Islam is the robot Ibn Sīnā. Ibn Sīnā was a respected Islamic philosopher, doctor, and luminary who lived between 980 and 1037. The robotic Ibn Sīnā was developed by Hanson Robotics. The robot can move its arms and has realistic facial expressions (Mavridis et al., 2012; Riek et al., 2010). In a pilot study conducted with 131 participants from 21 countries who interacted with Ibn Sīnā in the United Arab Emirates, it was determined that the attitudes of Arabs toward humanoid robots were generally quite positive; however, there were regional differences. Participants from the Gulf region (Iran, Iraq, Oman, Qatar, Saudi Arabia, the United Arab Emirates, and Yemen) had more positive views on humanoid robots than participants from Africa (Egypt, Morocco, Tunisia, Libya, and Sudan) (Riek et al., 2010).

The robot Veldan was developed in Iran to provide religious education to children (Associated Press, 2014). Furthermore, other social robots were developed in Iran as assistant teachers in compulsory religious courses such as *ḥijāb* and prayer. One was Arash, designed and manufactured at Iran Sharif Technology University, Social and Cognitive Robotics Laboratory. It has an LCD display and can talk, move and mimic various facial expressions. The NAO robot, the name of which was changed to "Nima" in Iran, is a similar religious education aid (Alemi et al., 2020).

1.2. Theomorphic Robots

Social robots are classified based on appearance. For example, Fong et al. (2003) suggested four categories: anthropomorphic, zoomorphic, functional, and caricatured. Shibata (2004) classified social robots as humanoid, familiar, and unfamiliar (imaginary) animal types. Based on various classifications, Baraka et al. (2020) proposed an expanded classification in which social robots can be classified as "bioinspired" (anthropomorphic, zoomorphic, or inspired by plants), "artifact-shaped" (based on cars, table lamps, cartoons), and "functional" (produced by the combination of technological parts for mostly mechanical tasks). Based on the abovementioned interactions

between religion and robotics, Trovato et al. (2016) contributed to this classification and introduced the concept of "theomorphic robots". The term theomorphic is derived from the Greek *theos* and *morphos*, implying divine-shaped.

Theomorphic robots can be anthropomorphic, zoomorphic, or idiomorphic with a unique design. The main distinction is the association of the robot's form with a divine concept. Thus, the issue of the reflection of the divine in a robot is raised. When Trovato et al. (2018a, 2021b, 550-552) proposed the concept, they established certain key points, such as adding new features to an object associated with an existing divine concept, called skeuomorphism, to benefit from familiarity with the original concept. Furthermore, the approach aimed to minimize the possibility of error via the resemblance of the divine (which cannot fail) and to design the robot almost identical to the original object/concept. Additionally, they proposed ten practical design principles: 1) an intermediary design that reflects the divine rather than imitating it, 2) naming based on the principles of skeuomorphism rather than robotic references, 3) the inclusion of sacred symbols, 4) sanctification by religious authorities for legitimacy (i.e., consecration by the church), 5) the inclusion of traces of sacred material (i.e., holy relics, sacred remains), 6) the use of the robot without diminishing the represented divine, 7) lower anthropogenic behavior and communication features based on the assumption that an anthropogenic robot would more likely be perceived as a product or as a toy, 8) the development of technical strategies to reduce perceived user control (e.g., without visible cables or buttons), 9) prevention of the reduction of ascribed sanctity, which can be eliminated by the perception of excessive control by the robot, 9) the employment of lighting generally associated with the divine, and 10) the use of tactile sensors due to the emotional impact of physical contact. SanTo and DarumaTo were developed based on these theomorphic robot design principles.

In their analysis, Trovato et al. (2021b, 545) determined that the mechanical monk, SanTo, and DarumaTo were theomorphic robots. BlessU-2, Mindar, Xian'er, and Pepper were excluded due to their appearances; they were not based on religious objects or sacred art. According to Löffler et al. (2021, 578), this issue could be debated, although BlessU-2 was not theomorphic. All humans could be

considered partially theomorphic since all humans are created in the image of God in Christian theology.

In human-robot interactions, robot design and cultural and religious human traits may affect individuals' attitudes toward robots. Personal beliefs play a key role in the theomorphic classification of robots and their use in religion. These robots concur with aniconism in Abrahamic religions, leading to resistance to the imitation of the divine by technology. The fact that Mindar was considered a Frankenstein's monster in Western literature is consistent with this approach (Balle - Ess, 2020, 586). In the following sections, the story of al-Sāmirī, which could affect the attitudes of Muslims toward theomorphic robots, will be addressed based on the abovementioned approach.

2. Al-Sāmirī's Calf as an Early Example of a Theomorphic Robot

Muslims believe that after Moses led the Israelites out of Egypt to Mount Sinai, they worshipped a calf made by a man called al-Sāmirī. This is described in detail in the Qurʾān, and it is also mentioned in the Torah, albeit with certain differences. There is a debate on the date of the Israelite migration from Egypt. Meral (2021, 24) conducted a comprehensive study and reported that the most accepted data were between 1250 and 1446 BCE. In this section, al-Sāmirī's calf is discussed based on the Qurʾān and the principles of theomorphic robots, and significant differences between the Qurʾān and the Torah are addressed. Then, the sociocultural background of the Golden calf story is presented. The sounds produced by the calf, why al-Sāmirī preferred a calf, and how and with what raw material the calf was produced are discussed based on the features of theomorphic robots. Finally, the reaction of Moses to al-Sāmirī's calf and the reasons for this reaction are discussed based on Qurʾānic verses.

2.1. Al-Sāmirī's Calf in the Qurʾān: A Bellowing Sculpture

According to both the Qurʾān and the Torah, the calf incident occurred after the Israelites migrated from Egypt and when Moses arrived at Mount Sinai. According to the Qurʾān, Moses went to Sinai for thirty days but remained for an additional ten days. Meanwhile, a man called al-Sāmirī, a member of the people of Moses, melted the jewelry he collected from the Israelites in a fire and sculpted a calf statue. Thus, it could be suggested that the calf was sculpted and used

in the space and time when the Torah was revealed at Mount Sinai, in accordance with Trovato's principle of "the employment of a place and context that would not diminish the sanctity attributed to the robot". There is no specific definition of a "Golden calf" mentioned in the Torah or the Qurʾān in relation to the calf created by al-Sāmirī. According to the Torah, the calf was made using "gold earrings". Conversely, the Qurʾān uses the term "adornment", which encompasses various items such as silver and gold (Meral, 2021, 83). Consequently, the phrase "Golden calf" emerged due to the inclusion of terms such as "gold earrings" and "jewelry" in both Jewish and Islamic traditions. The term "Golden calf" is also used to refer to calves produced by Jeroboam in the 1st Book of Kings (1 Kings 12:28).

The calf incident in the Qurʾān is directly mentioned in Sūrat Ṭā-Hā (Q 20:83-97) and Sūrat al-Aʿrāf (Q 7:148-154). The "bellowing" is emphasized in both sūrahs in the Qurʾān: "*Then, he molded for them an idol of a calf that made a lowing sound. They said, 'This is your god and the god of Moses, but Moses forgot where it was!' Did they not see that it did not respond to them, nor could it protect or benefit them?*" (Q 20:88-89) and "*In the absence of Moses, his people made from their golden jewelry an idol of a calf that made a lowing sound. Did they not see that it could neither speak to them nor guide them to the Right Path? Still, they took it as a god and were wrongdoers.*" (Q 7:148).

So Moses returned to his people, furious and sorrowful. He said, "O my people! Had your Lord not made you a good promise? Has my absence been too long for you? Or have you wished for wrath from your Lord to befall you, so you broke your promise to me?" (Q 20:86). Moses was separated from his people for 30 days. According to the verses, the Israelites started to worship the calf during the 10-day delay (Sayı, 2012, 222; Yalçın, 2021). When Aaron tried to warn them, they replied, "*We will not cease to worship it until Moses returns to us.*" (Q 20:91). In the Torah, it is mentioned that due to the delay of Moses, the Israelites demanded idols (Exod. 32:1-6). In response to Moses' questions, the Israelites explained how they made the calf with their jewelry (Q 20:87). However, according to the Qurʾān, the Israelites' belief in a "concrete God" continued even after they left Egypt (Meral, 2021, 132). For example, they asked Moses to make an idol for them (Q 7:138), and they told Moses, "*O Moses! We will never believe you until we see God with our own eyes, so a thunderbolt struck you while*

you were looking on." (Q 2:55). Based on Geraci's (2007) hypothesis that people experience fear and fascination about technological advances and elevate smart machines to divine status, a calf that produced sounds would significantly affect a community in search of a concrete god.

The story of al-Sāmirī is mentioned in Exod. 19, 24, 32, Deuteronomy, and Nehemiah 9 in the Torah (Yalçın, 2021). Although there are similarities between the Qurʾān and the Torah, there are also important differences. For example, the Qurʾān states that someone called al-Sāmirī made the calf with the permission of a "messenger", while the Torah does not mention a messenger; Moses' brother Aaron made the calf (Exodus 32:1-6). In both cases, it is observed that al-Sāmirī acted in accordance with the principle of the "attribution of sanctity by religious authorities to achieve legitimacy" (Trovato et al., 2018a, 2021b). An important difference is that the Torah does not mention bellowing, through which the calf acquires the status of a robot; however, the bellowing is noted at all times when the incident is mentioned in the Qurʾān. Prior to a detailed discussion, information about the sociocultural structure of the period will make it easier to comprehend why the Israelites were influenced by al-Sāmirī's calf.

2.2. Robotic Vision in Ancient Egypt: The Singing Sculpture

Egypt at the time of Moses was a technologically advanced and strong state (Shaw, 2013, 3) with a centralized bureaucracy (Ajdini, 2014; Ezzamel, 1997) based on mythological and ideological foundations (Hart, 1995, 7-8; Olgun, 2021, 7; Valbelle, 1998, 11). Magic, which was a mixture of religion/mythology and science, was one of the most important elements that determined the beliefs and daily life of the ancient Egyptians (Shaw, 2013, 44; Sipahioğlu, 2021, 209-212). It was believed that the statues, which were attributed special magical meanings, possessed the spirits of inanimate objects (Budge, 1988, 10; Şimşir, 2018, 95); for example, a crocodile statue could be turned into a real crocodile by magic. The ancient Egyptians believed that an inanimate object in the form of a human or animal could be brought to life with difficult-to-pronounce words or formulas and that these objects would protect them in both this and the next world (Şimşir, 2018, 99-100).

Since the Israelites settled in Egypt during the reign of Joseph, it could be argued that their worldview was affected by the magical

doctrines of Egypt. The Talmud mentions holy individuals who created artificial beings called "Golems" (Gee, 2001). The term Golem (Skvorchevsky et al., 2019), which means made of clay and/or "formless matter", could also be translated as "fetus" or "defective being". The term "*Galmī*" (my *golem*) in the psalm means "fetus or unspiritual form". It is written in the Talmud that Adam was a *golem* for the first twelve hours of his creation (Yanarocak, 2014). Golems, known as "soulless creatures" in Jewish tradition, were created by magicians as "slaves" (Meral, 2021, 79). It was reported that Loew ben Bezalel, the "Rabbi of Prague", who lived in Prague in the 16th century, created a clay Golem on the banks of the Vltava River. When the piece of paper with the inscription *schem* (God's name) was removed, the Golem was turned back into clay (Dekel - Gurley, 2013). Various studies have associated golem legends with modern artificial intelligence and robotics (Giuliano, 2020). Contrada (1995) investigated the correlation between the term robot, which means "slave" in Czech, and the "golem" and reported that there were several similarities between the two. According to Norman (1995), both were created by humans, both included mystical elements, and the mission of both was to serve humans. Vudka (2020) argued that the Golem was an early AI prototype. Norbert Wiener (1964, 95), the founder of cybernetics, associated the Golem directly with artificial intelligence in *God, Golem, Inc.* He argued that "the machine is the modern equivalent of the Rabbi of Prague's Golem". Meral (2021, 78, 79) argued that the calf created by al-Sāmirī resembled a golem, claimed that inanimate objects could be made to talk with various tricks in ancient Egypt, and attributed al-Sāmirī's "bellowing calf" to his mastery of magic. Archaeological studies have revealed that Egyptian priests created fake "talking statues" with certain techniques to impress believers (Price, 1964). Two of these sculptures have survived. In 1936, a large limestone bust of the sun god Ra-Harmakhis was found during an expedition in the Egyptian capital, Cairo. The Egyptologist Lukianoff examined the bust and discovered a channel in the mouth behind the neck. Archaeologists speculated that priests spoke through this channel while hiding behind the statue. The channel served to present divine prophecies based on changes in the tone of the priest's voice (Ambrosetti, 2012, 310; Mayor, 2018). Another such statue was the statue of the "Jackal, the God of the Dead", the head of which is

exhibited in the Louvre. The statue, known as Anpu (Greek: Anubis), was used by priests to declare prophecies through a secret tube (Ziolkowski, 2015).

In "Gods and Robots: Myths, Machines and Ancient Dreams of Technology", Adrienne Mayor argues that the first robot on earth was a giant called "Talos" in Ancient Greek mythology, although this idea originated in Egypt (Mayor, 2018, 6). Undoubtedly, monuments such as the "Giant Statues of Memnon" made Egypt the center of imagination. The twin statues built in 1350 BC in the ancient Egyptian capital of Thebes (today, Luxor) were dedicated to the 9th king of the 18th dynasty, Amenhotep III. Several studies claim that the northern statue sang (Łukaszewicz, 1995; Mayor, 2018, 7; Wilkinson, 2010, 243-244). These two giant statues, whose height exceeds 18 meters, still stand today. Around 23 AD, Strabo of Amasya wrote that the statue of Memnon made a sound in the early hours of the morning after sunrise in the last volume of his 17-volume *Geographica* (Gardiner, 1961; McCormack, 2016). Furthermore, historians and artists such as Philostratos, Plinius, Juvenal, and Tacitus also mentioned the same feature (LaGrandeur, 2010). There are 107 inscriptions on the sculptures that date to 20-205 AD and that were cataloged by the French archaeologists A. Bernard and E. Bernard (Natoli et al., 2022, 301). Patricia Rosenmeyer (2018) analyzed the Latin and Greek inscriptions, mostly in verse, engraved on the legs and feet of Memnon statues and cited the testimonies of several named and unnamed individuals, such as poets, writers, military commanders, or ordinary pilgrims, that they heard the abovementioned sounds (Day, 2020). The famous poet Paion of Caria, who participated in the Egyptian expedition of Emperor Hadrian in 130, wrote that he heard Memnon's voice when he was under the left foot of the statue (Akdoğu Arca et al., 2011). Memnon statues were believed to be built by Thoth, the god of wisdom, in ancient Egypt; they were considered divine and believed to convey the messages of the gods (Merlet, 2000). Additionally, various theories were proposed to mechanically explain the sound of Memnon statues. McCormack (2016) examined the sculptures phonetically and claimed that several ancient sources explained these sounds and discussed mechanical explanations for the source of the sounds. Several theories attributed the source of these sounds to "material vibration". The French archaeologist Jean-Antoine Letronne

suggested that the source of the sounds was rocks heated by sunlight that vibrated the statue and generated the sounds (McCormack, 2016). It was reported that the sound of the Memnon monuments was never heard after Roman Emperor Settimo Severo repaired the damage to the statues in 199 AD (Casciati - Borja, 2004).

Evidence for the use of prosthetics in ancient Egypt suggests that the interest was not based on imagination (Hernigou, 2013). Ancient Egypt also hosted certain examples of early "cyborgs". An artificial big toe that was dated to 600 BC was discovered in Thebes (Finch, 2011). The artificial toe was found on a female mummy near modern-day Luxor, dated to 710 BC, and described as possibly the earliest known intravital limb prosthesis (Nerlich et al., 2000).

According to Mayor, the ancient Egyptian belief in artificial animate divine beings was not born but made, providing an idea about the sociocultural origins of the "Golden calf" incident. According to Philo and some Christian clergy, the Israelites learned the concept of the golden calf from the Egyptians (Maden - Yiğitoğlu, 2018). Although the Torah does not mention that the calf produced any sounds, the abovementioned cultural background could be the basis of the sounds produced by the calf, as mentioned in the Qurʾān. The story in the Qurʾān mentions a "bellowing" calf and states that the Israelites worshiped the calf, which they considered "divine". As mentioned in the Qurʾān, al-Sāmirī's calf was "made" and could produce sounds (Mayor, 2018, 2, 4). The fact that the calf was associated with the cult of the bull in ancient Egypt and divinity was attributed to the calf (Trovato et al., 2018a, 2021b) suggests that the calf could be considered an early theomorphic robot. If it could be accepted that the calf was produced around 1250-1446 BC (Meral, 2021, 24), al-Sāmirī's calf could be considered one of the first examples of theomorphic robots.

2.3. The Calf's Voice as a Robotic Feature: Was the Calf Animate or Inanimate?

The Qurʾānic mention of the "bellowing" of the calf led to a debate among Muslim commentators on whether the calf was "alive". Meral (2021), who discussed the topic comprehensively in *Sâmirî'nin Buzağısı*, reported that there were two approaches in the commentaries. According to the first commentary, al-Sāmirī's calf was real and live. According to other commentaries, it was not a living being but a calf-shaped sculpture. The airflow that passed between the

holes at the anus and mouth of the calf led to the production of the "bellowing" sound (Meral, 2021, 72). Although the Torah does not mention that the calf was animate, certain Jewish sources claim that the calf was "alive or looked alive". Based on the phrase "which eats grass" in Psalms 106:19-20 ("At Horeb, they made a calf and worshipped an idol cast from metal. They exchanged their glorious God for an image of a bull, which eats grass"), certain sources argue that the calf was alive. For instance, the animate perception of the calf in the midrash Shir ha-Shirim[1] is attributed to Egyptian sorcerers. Certain Torah interpretations mention a calf that can speak and is supposed to say "I am your Lord" due to the secret inscription "Yahve" on a plate that was disposed to fire (Meral, 2021, 73). Pregill (2020, 318) comparatively analyzed the "Golden calf" in the Bible and the Qurʾān, and the late Midrashic collection mentions an alive calf.

Pregill (2020, 324) discussed the "bellowing" feature of the calf in detail and stated that it should be considered an "image of a bellowing calf" rather than an actual bellowing calf. In other words, according to Pregill, "bellowing" should not be considered a behavior performed by the Golden calf but a common feature of all calves. Pregill interpreted the expression "the bull ate grass" in the Psalms similarly, not as a form that eats grass but as a common behavior of a bull. The bull idol was an image of a bull that eats grass. Pregill (2020, 327) argues that the image of a magic calf bellowing like a live cow is untenable. However, in our opinion, the "bellowing" property of the calf was a technological, not biological, property. As mentioned above, certain Qurʾānic commentaries support that approach. Additionally, the ancient Egyptian belief that the properties of living beings could be attributed to inanimate objects and the possibility of the availability of such a technique should be considered.

2.4. Skeuomorphism in the Golden Calf: Why Did al-Sāmirī Sculpt a Calf?

Why did al-Sāmirī prefer sculpting a calf over another object or animal? Certain studies have suggested that al-Sāmirī's calf sculpture could be associated with the ancient Egyptian cult of the bull. The calf

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[1]   The Midrash is a corpus of Jewish scripture readings in synagogues and related explanations. It can be compared to the Qurʾānic commentary in the Islamic tradition.

seems consistent with the skeuomorphism that Trovato et al. (2018a, 2021b, 550) considered a theomorphic robot design principle.

According to the Egyptologist Wallis Budge, people believed that the magical power of a priest or an individual was unlimited, and inanimate symbols and objects that obeyed the commands of the magicians became living beings (Budge, 1988, 10). Studies on ancient Egypt indicate that the cult of the bull was prominent in Egyptian belief (Markovic, 2016; Wainwright, 1933; Wilkinson, 2010, 434-435). The bull and cow are known as symbols of power; Osiris, the god of agriculture, was symbolized by the bull, and Isis by the cow (Döner - Menteş, 2022). Apis (Freeman, 2003, 72), Buchis, and Mnevis, also called Serapis since it forms a compound with Osiris in some sources, are among the well-known bull cults (Dodson, 2005). Apis was believed to be the incarnation of the creator God Ptah (Gardin - Olorenshaw, 2019, 119). The first religious burial place was built for the holy bull Apis during the reign of Amenhotep III (Wilkinson, 2010, 242). In several commentaries, such as al-Zamakhsharī's *al-Kashshāf*, it was stated that al-Sāmirī originally belonged to a community that worshipped cows (Meral, 2021, 49; Salihoğlu, 2009, 78). After the Sumerians, the bull was associated with power and symbolized holiness and divinity, especially in Mesopotamian societies in Anatolia and Egypt (Gardin - Olorenshaw, 2019, 117-119; Mutlu, 2019). The bull, considered a symbol of religious, political, economic, and sexual power, then became a universal symbol in Indo-European cultures (Rice, 1998).

2.5. "Divine" Alloy in the Golden Calf: How was the Calf Produced?

The production of the calf is a topic of serious debate. The Qurʾān mentions that the calf was produced from "adornments" (such as gold and silver), while the Torah states that "golden earrings" were used in the production of the calf. Although the expression "Golden calf" is not common in either book (Meral, 2021, 83), both claim that the raw material was "metal". In Q 7:148, the word *ḥuliyy* is used to describe the raw material of the calf. *Ḥuliyy* and its plural *ḥuliyyāt* denote ornaments such as earrings, rings, and necklaces made of precious metals such as gold and silver (Bekiroğlu - Taşdoğan, 2020). The identity of the producer of the calf is also important to understand how it was produced. However, the identity of this person has been a topic

of considerable debate. According to Meral (2021, 110), al-Sāmirī is an ancient Egyptian word composed of the words "sa", meaning son, and "meri", meaning beloved; it, therefore, means "beloved son". It is thought that the person meant here by "beloved son" is Joseph, who is mentioned in both the Qurʾān and the Torah as Jacob's favorite son. The Qurʾānic form of the word "Sāmirī" is al-Sāmirī with the definitive article "*al-*" at the beginning and an attributive letter, "*yāʾ al-nisbah*" at the end. This nomenclature is understood to be used in relation to a city, tribe, or nation. Within the framework of these explanations, the name al-Sāmirī is used in the sense of "belonging to the beloved son" or "from the tribe of the beloved son", that is, "al-Yūsufī". Salihoğlu (2009, 78) argued that al-Sāmirī was a member of the Samira tribe. Al-Mawdūdī (2005, 269) claimed that al-Sāmirī's real name could be Aaron; however, he was not the prophet Aaron. We will avoid this discussion for the purposes of the present study and use the name al-Sāmirī. For the current article, an important detail about al-Sāmirī's identity is the argument that al-Sāmirī could be a foundry master (Sayı, 2012, 224). In his commentary, *Tafhīm al-Qurʾān*, al-Mawdūdī described al-Sāmirī as an "artist" and claimed that he deceived the Israelites by sculpting a calf that could bellow (al-Mawdūdī, 2005, 271). The Torah states, "And he received the gold from their hand and fashioned it with a graving tool and made a golden calf." (Exod. 32:4).

A detail provided in the Qurʾān about the construction of the calf by al-Sāmirī is important in terms of the principles of the "incorporation of sacred symbols" and "inclusion of the traces of divine in the material" proposed by Trovato et al. (2018a, 2021b, 551). Al-Sāmirī said, "*I saw what they did not see, so I took a handful from the traces of the Messenger and threw it away, and likewise I asked myself.*" (Q 20:96). The "messenger" in the verse has generally been interpreted as the angel Gabriel in the commentaries. Thus, Gabriel arrived on his horse to present Moses to God, and al-Sāmirī used a handful of dust from the point where Gabriel's horse stepped as raw material for the calf. However, there are other interpretations. It has been argued that following the messenger's footsteps meant the instruction of Moses (Işık, 2014). Pregill (2020, 329, 330) argued that the hoof-prints of the messenger could be interpreted metaphorically as "an example" based on the arguments of Abū Muslim al-Iṣfahānī and Fakhr al-Dīn al-Rāzī. Thus, according to this interpretation, al-Sāmirī ignored the example

of Moses. Meral (2018, 92-93) interpreted the hoof-prints of the messenger as the heritage of Joseph. According to Judaic sources, Joseph's coffin included items such as a spell book, shroud, amulets, wax, and a bull statue. According to Meral, the hoof-prints of the messenger could indicate these items. The significance of this discussion for the present paper is the inclusion of certain divine items (the soil that Messenger's horse stepped on or the heritage of Joseph) in the raw material of the calf. Trovato et al. (2018a; 2021b, 551), who conceptualized theomorphic robots, argued that the inclusion of sacred symbols or sacred materials in theomorphic robot design would increase their perceived divinity. Table 1 presents the compatibility of al-Sāmirī's calf with the theomorphic robot design principles proposed by Trovato et al. (2021b).

2.6. Moses' Reaction: What Happened to al-Sāmirī's Calf?

In the Qurʾān, the reaction of Moses to al-Sāmirī and the fate of the calf are clearly conveyed. The Qurʾān's narrative is important for understanding the attitudes of Muslims toward theomorphic robots. It could be suggested that the Qurʾān's approach was centered on apostasy.

According to the Qurʾān, Moses learned about the transformation his people experienced while he was on Mount Sinai: "God asked, "Why have you come with such haste ahead of your people, O Moses?' He replied, 'They are close to my tracks. And I have hastened to You, my Lord, so You will be pleased.' God responded, 'We have indeed tested your people in your absence, and the Sāmirī has led them astray'." (Q 20:83-85).

The Qurʾān describes the attitude of the Israelites toward the calf as "apostasy" and al-Sāmirī as the apostate. What is remarkable in the Qurʾān is the fact that it emphasizes the material used to produce the calf, its function, and whether it had the potential to benefit or harm; it is an objective and neutral description. In Q 20:88-89 and Q 7:148, the reaction of the Qurʾān is associated with the meaning and mission attributed to the calf. In other words, the Qurʾān opposes the "divinity" mission attributed to the calf, not the calf itself. The calf served as a tool of apostasy. Albayrak (2001) argued that the real manipulator in the incident was al-Sāmirī and considered the calf's role in misleading people as secondary. Sūrat Ṭā-Hā describes how the Children of Israel went astray as they worshipped the calf: "*Aaron had already warned*

them beforehand, '*O my people! You are only being tested by this, for indeed your one true Lord is the Most Compassionate. So, follow me and obey my orders'. They replied, 'We will not cease to worship it until Moses returns to us'.*" (Q 20:90-91). However, according to certain Jewish sources, the Israelites worshipped the calf not as a god but as a representation of God. According to certain authors, similar to the representation of Amon-Ra by the Apis bull, the calf was a reflection of Yahweh (Meral, 2021, 54, 57). However, in the Qurʾān, assigning a "divine" mission to any creature other than God, animate or inanimate, is defined as *shirk* and the worst of all wrongs (Q 31:13).

The story of al-Sāmirī ends when Moses questions al-Sāmirī and informs him that he will burn the calf. Moses then asked, "*What did you think you were doing, O Sāmirī?*" He said, "*I saw what they did not see, so I took a handful from the traces of the Messenger and threw it away, and likewise I asked myself.*" (Q 20:95-96). Moses said, "*Go away then! And for the rest of your life, you will surely be crying, 'Do not touch me'! Then, you will certainly have a fate that you cannot escape. Now look at your god to which you have been devoted: we will burn it up, then scatter it in the sea completely.*" (Q 20:97). Then, Moses addressed his people: "*Your only god is Allah, there is no god worthy of worship except Him. He encompasses everything in His knowledge.*" (Q 20:98).

The verses on the story of al-Sāmirī prohibit the attribution of a "divine will, image, or identity" to any "inanimate" object. Moses' statement that he would burn the calf was consistent with that approach. Thus, Moses wanted to show that the calf did not have divine power. In fact, he did not mean to destroy and burn the calf itself but the meaning attributed to the calf. However, this should not be interpreted as the prohibition of robotic objects in religious matters.

Discussion and Conclusion

The robotics-religion interaction is still a new field. The issue of social robots in religion in the interaction of religion and robotics, as emphasized by Nord et al. (2023), led to a special field that tested individual religious practices, religiosity, and religious ideas, allowing practitioners to study questions such as "Can God-human interaction be improved with computer-human interaction?" and "Can these applications replace religious officials?" Thus, a new field is available

to investigate the phenomenon of religiosity, a main topic of the psychology of religion. The limits of robotics in religious matters and worship will be an important topic of debate in the coming years. In the present study, al-Sāmirī's calf was analyzed within the context of "theomorphic robots", a term that was introduced due to developments in the robotics-religion interaction.

The analysis of al-Sāmirī's calf based on the principles of theomorphic robot design (Trovato et al., 2021b) suggests that several properties of the calf are compatible with theomorphic features. The popularity of the cult of the bull in ancient Egypt, the consideration of bulls as the embodiment of God, and the interpretation of bulls and cows as symbols of power, holiness, and divinity (Döner, 2022; Gardin et al., 2019; Markovic, 2016; Wainwright, 1933; Wilkinson, 2010) were prominent in the period and the geography where the calf was sculpted. Thus, it can be observed that the calf was designed based on a theomorphic robot design principle, called skeuomorphism, namely, "the inclusion of new features in object design, by preserving the existing divine attributes to benefit from the familiarity of the users with the original object (Trovato et al., 2021b, 550)." ompliance with this principle probably increased the potential of the object to influence the target audience. Furthermore, since the design was highly similar to the original structure, another principle was due to the "bellowing" sound. The presence of traces of the divine in the material was another principle that aimed to increase the perceived divinity of robots. The calf was allegedly produced with metal obtained by melting jewelry. However, the possibility that the calf's raw material included the dust of the messenger or Joseph's heritage could be considered an intent to include traces of the divine in the object. The Torah mentions that Moses' brother Aaron sculpted the calf, while the Qurʾān quotes al-Sāmirī as saying, "This is the deity of Moses, but he forgot". In both cases, religious authorities such as Moses and Aaron are mentioned to achieve divine legitimacy. This is another design principle. The ability of the calf to produce sounds was the most prominent technical feature, and the lack of visible technical details such as buttons and pipes facilitated the attribution of divinity, demonstrating that the calf followed the principle of preventing the perception that the user controlled the robot.

Implementing a divine/religious/sacred idea makes a robot "theomorphic". This can also be observed in al-Sāmirī's calf. However, al-Sāmirī's calf does not comply with the first principle of Trovato et al. (2021b). This principle suggests that the product should not pretend to be a god to deceive or manipulate the user and should not be an alternative to the divine, but its identity should reflect the divine. However, the boundary between the role of "imitating the divine" and "reflecting the divine" is not clear in this principle. How can one know whether the limit is exceeded? The first principle of Trovato et al. (2021b) is "ambiguous". Nord et al. (2023) note that it is not clear what Trovato et al. (2021b) mean by the "assignment of the divine to robots". The authors emphasize that there is almost no definition of a divine figure. What does a divinely shaped robot mean? Is it the application of certain historical codes and forms of religious art in robots, or do these robots have a "divine essence"? Nord et al. (2023) associate the lack of a definition with Trovato et al. (2021b), who do not interpret the meaning of the assignment of a divine form to robots. Thus, the compatibility of al-Sāmirī's calf with the first principle becomes a question of interpretation that is open to debate. The present study attempted to answer the question, "Can al-Sāmirī's calf be considered an early example of theomorphic robots?" To answer this question, we used the ten principles of theomorphic robots reported by Trovato et al. (2021b, 550-552). Although certain principles (9 and 10) are inconsistent (Table 1), al-Sāmirī's calf can be considered a theomorphic robot. Undoubtedly, it would not be accurate to consider al-Sāmirī's calf, which was produced in 1400 BCE, completely compatible with contemporary robots (that employ touch sensors, light, etc.). As argued by Mayor (2018), the emphasis should be on the idea of robots, which entails efforts to create artificial life. This idea can be observed in al-Sāmirī's calf.

In the story of al-Sāmirī, it can be suggested that the attribution of will or self-proclaimed sanctity to an inanimate object would create a general resistance to robots in Islam. It is known that the cultural and religious background of individuals influences the acceptance of technological products (Albirini, 2006; Baffelli, 2021; Riek et al., 2010; Straub et al., 2003; Thomas, 1987; Weng et al., 2019). Empirical studies conducted in the West have revealed a positive correlation between religiosity (Giger et al., 2017; Metzler - Lewis, 2008) and belief in the

uniqueness of human nature (Metzler - Lewis, 2008) and an individual's negative attitudes toward robots. Based on the narrative of the fate of the artificial calf, we could suggest that there is a correlation between the attribution of sanctity to entities in Muslim societies and negative attitudes toward those entities. However, it should also be considered that this correlation could change based on religiosity and different religious interpretations.

In the conceptualization of theomorphic robots, the perception of the robot as divine is prominent. For this purpose, certain design strategies mentioned in the previous sections are employed. Although the boundaries of the robotics-religion interaction are still unclear, the status of robots in religious affairs should be discussed by theologians. We recommend discussion of the details of the perception or presentation of robots in the role of a "subject" of a divine mission and property, in the role of a convergence "agent" between God and humans, in the role of a worship "proxy" that performs on behalf of believers, or in the role of a "tool" to fulfill religious duties and produce knowledge on these different roles based on the principles of faith. The analyses of these distinctions based on Islamic law claim that these applications cannot be considered moral or legal (Gezer, 2022; Görgülü - Kesgin, 2021).

In Islam, robots are considered a tool without attribution of divinity in religious applications (e.g., ablution automat, religious teacher assistants Veldan and Arash). They do not directly replace the religious official, as in the case of Pepper, and they do not allow users to attribute divinity to the robots, as in the cases of SanTo and Mindar. Although social robots have been used in Islam, none could be considered theomorphic robots. Thus, there are no studies on the attitudes of Muslims toward these robots. However, attitudes toward robots employed in religious education have been investigated. More than 90% of primary school students in the abovementioned studies definitely preferred robot-assisted religion courses to courses instructed by humans (Albirini et al., 2006). As observed in the case of the robot Ibn Sīnā, the attitudes of those who interacted with the robot were generally positive (Riek et al., 2010). These robots could be employed as "tools" for religious education or Islamic worship. We believe that the attribution of the divinity of robots in the roles of subjects, mediators, or proxies beyond being tools in religion would

lead to resistance to social robots in Muslim societies. Since beliefs affect individuals' emotions, ideas, and behavior (Paloutzian - Park, 2005), it could be argued that the artificial calf and its fate described in the story of al-Sāmirī would lead to resistance. Furthermore, the prohibition of the images of God and Muḥammad, or aniconism, would affect the rejection of the representation of the divine in robots.

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Table 1: Comparison of theomorphic robot design principles (Trovato et al., 2021) and

al-Sāmirī's calf

Theomorphic robot design principles	*Compatibility of al-Sāmirī's calf*	*Details*
A mediator identity that reflects the divine but does not imitate it.	Controversial	Al- Sāmirī identified the calf as a deity; thus, it is controversial.
Naming based on the principle of skeuomorphism rather than robotic references.	Compatible	Al-Sāmirī sculpted a "calf" statue in accordance with the sociocultural bull/cow cult of the Israelites, and it was introduced as a calf.
Inclusion of divine symbols.	Most likely compatible	It could be suggested that there was no need to use a divine symbol since it was

		constructed based on a cult that was inherently a symbol of holiness.
Sanctification by religious authorities to acquire legitimacy.	Compatible	Al-Sāmirī's calf was associated with Moses in the Qurʾān and with Aaron in the Torah.
Employment of the traces of divine material.	Compatible	The raw material of the calf included a plate with the inscription "Yahve", or the heritage of Joseph.
Employment in a spatial context that would not reduce the divinity represented by the robot.	Compatible	It was constructed in a context and a place where Moses received the Torah.
Exclusion of anthropogenic movements or communications since these could lead to the perception of the robot as a toy.	Compatible	The form did not diminish the perception of the divine and did not reflect all movements and sounds of a calf.
Development of technical strategies to reduce the perceived control of the user.	Compatible	The calf was designed to generate the perception that it creates the sound, and the user does not have mechanical control.
Employment of lighting associated with the divine.	Incompatible	No data available.
Employment of tactile sensors due to the positive impact of physical touch on senses.	Incompatible	No data available.