

Article

Sacred Journeys in Digital Islam: Ageing, Pilgrimage, and the Ethics of the Digital Divide

Abdul Basit Zafar ^{1,*} and Geneva Blackmer ² ¹ International Center for Comparative Theology and Social Issues (CTSI), University of Bonn, 53111 Bonn, Germany² Faculty of Divinity, University of Cambridge, Cambridge CB2 8PH, UK; gcb45@cam.ac.uk

* Correspondence: azafar@uni-bonn.de

Abstract

This article examines how pilgrimage to sacred sites is being reconfigured through digital navigation systems and how these transformations intersect with the digital literacy challenges faced by ageing pilgrims. Situating the study within broader discussions on digital religion and pilgrimage, it explores how access to holy spaces is increasingly mediated by platforms that regulate verification, mobility, and ritual logistics prior to physical arrival. Focusing on Nusuk as a case study, the article examines Saudi Arabia's official digital platform for Hajj and Umrah services at the holiest sites of Islam, through which pilgrims access registration, package selection, permits, booking, payment, guidance, transportation coordination, and various related pilgrimage services. The article draws on interdisciplinary analysis of existing research on pilgrimage, digital Islam and the larger digital divide. It argues that contemporary pilgrimage now begins within digitally governed environments, where participation depends on the ability to navigate interfaces, authentication systems, and algorithmic processes. While these technologies are framed as enhancing efficiency and safety, they simultaneously presuppose forms of access, literacy, and adaptability that many older pilgrims do not hold, thereby producing new dependencies and, in some cases, barriers to active participation. The study demonstrates that digital mediation reshapes both agency and sacred space, transitioning authority from embodied and communal practices to device-based guidance and automated systems. It concludes that contemporary holy cities must be understood as ethical infrastructures in which questions of access, care, and inclusion are central and proposes a “digital theology of pilgrimage” and ageing that calls for greater responsibility among religious institutions, communities, and platform designers to address the digital divide.

Keywords: holy cities; pilgrimage; digital theology; theology of pilgrimage; theology of ageing; digital Islam; sacred and secular; religious tourism; digital divide



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1. Pilgrimage in Transition: Historical Foundations and Digital Adaptations

Pilgrimage, or Hajj in the Muslim context, has historically been understood across traditions as an embodied journey structured through ritual movement, communal memory, and spatial orientation toward sacred sites. The notion of sacred space is widely shared across the world's religions, and involves a complex relationship between the pilgrim, the environment, venerated objects, historical memory, and belief. Within this context, the pilgrim functions both as the acting subject and as the witness of holy sites, embodying a

collective sense of motivation, anticipation, and expectation in pursuit of a transformative, and facilitated encounter (Dyas 2021, pp. 24–30).

In Islamic contexts, the ḥaram of Mecca and Medina has functioned as a sanctuary of peace and sacredness, a symbolic centre of unity for the Ummah, and a theological anchor for Muslim belonging. In this setting, a pilgrim, is an adult believer who travels to holy sites with a sincere intention (niyya) and actualizes that intention through bodily movement. Pilgrimage in Islam is thus not just as a physical journey but a religious act grounded in intention, devotion, and moral principles (Qurʾān 2:125; 5:97; al-Bukhārī, Ṣaḥīḥ al-Bukhārī, no. 1:). Within the Judeo-Christian tradition, the Old Testament approaches pilgrimage as a mode of engagement by which one “journeys with” God, as exemplified by Abraham and the narrative of Exodus (Gen. 12:1–4; Exod. 13:21–22), or “journeys to” God through an encounter with a particular place, such as Jerusalem (Deut. 16:16; Ps. 84:1–7; 122:1–4). The New Testament extends this possibility further, presenting a way of “journeying with God” even further, by which one travels with Christ throughout the course of their life and making this path universally accessible to believers through the Holy Spirit (Luke 9:23; John 14:16–18; Matt 28:20; Dyas 2021, pp. 53–55).

Moving into the twenty-first century: pilgrimage is no longer organised only through travel guides, printed manuals, religious teachers, and face-to-face institutions. It is increasingly mediated through digital platforms, mobile interfaces, algorithmic systems, and online knowledge networks. The emergence of centralised digital platforms, supported by algorithmic governance models and embedded navigation systems, has shaped the conditions under which pilgrimage sites are imagined and accessed, and ritually performed. In the context of Islamic pilgrimage (Hajj and Umrah), this transformation is especially visible. Pilgrims now rely on digital applications for visas, bookings, transportation, ritual reminders, navigation, certificates, notifications, and communication with officials and service providers. The sacred journey has become inseparable from digital infrastructures (Ministry of Hajj and Umrah 2026).

Within the Islamic tradition, these concerns are grounded in the higher objectives of Islamic law (Maqāṣid al-sharīʿa), and the higher objectives of Islamic theology (Maqāṣid al-ʿAqīda). Maqāṣid al-Sharīʿa is particularly concerned with the preservation of religion (ḥifẓ al-dīn), the removal of hardship (rafʿ al-ḥaraj), the promotion of public benefit (maṣlaḥa), and the upholding of human dignity (karāma). Maqāṣid al-ʿAqīda, in turn, extends this ethical evaluation by asking whether digital mediation preserves the theological meaning of pilgrimage as an act of intention (niyya), worship (ʿibāda), embodied devotion, and truthful orientation toward God (cf. Abdelnour 2022). While comparable ethical concerns can be found in other Judeo-Christian traditions, the Islamic framework offers distinctive resources for evaluating digital tools such as the Nusuk platform, especially in relation to accessibility, ritual participation, the preservation of sacred meaning, and the moral responsibilities of technological mediation.

This shift is not merely technical. It reflects a broader transformation in religious life that scholars describe as “digital religion”: the interweaving of offline and online religious practices in contemporary spiritual life. Rather than treating technology as external to religion, this perspective shows how digital systems reshape authority, authenticity, ritual practice, and communal belonging (Guenther et al. 2025). Campbell emphasises the need to understand contemporary religion through the intersection of in-person and digital religious practices. In such contexts, religious engagement is no longer mediated primarily by geography, inherited authority, and stable institutional affiliations. Digital environments also permit more individualised forms of participation and even more selective social connection¹ (Campbell and Bellar 2023). Applying Campbell’s ideas to Muslim pilgrimage suggests that the pilgrim’s journey is no longer shaped solely by analogue instruction man-

uals, travel group leaders, or local scholars. Rather, it is shaped increasingly by apps, social media, online sites, YouTube tutorials, WhatsApp group coordination, GPS tools, platform notifications, and related digital systems (Hashemi et al. 2024; Youvan 2024; Beard 2024; Hamzi 2026).

This paper offers an interdisciplinary conceptual and theological analysis of digitally mediated pilgrimage. It brings digital religion, pilgrimage studies, research on Hajj technology, ageing studies, and Islamic ethics into dialogue in order to examine how digital infrastructures reshape sacred access, religious authority, ageing, and inclusion.

Studies related to “digital Islam” have developed across multiple intersecting disciplines rather than from a single academic domain. This body of work includes research in digital religion, Islamic studies, media and data studies, tourism-related information systems and urban development. However, alongside technical considerations, attention must also be given to the human and conceptual dimensions of digital theology, applied ethics, and the dilemmas presented by interfaces. The sources engaged in this article combine technical research on pilgrimage infrastructures with broader theological and ethical interpretation as a task that requires intense conceptual reflection. The literature is geographically diverse, featuring substantial contributions from scholars and engineers across the wider West Asian region, Europe, North America, and various Muslim-majority countries. The research mentioned here examines pilgrimage from practical concerns related to mass gatherings, crowd management, pilgrim safety, platform design, and health monitoring within the context of urban technological infrastructures (Showail 2022; Mubarak and Suomi 2022; Aina et al. 2023; Sheikh 2025). Yet many of these studies do not explicitly identify themselves as contributions to “digital Islam”. They often approach Hajj and Umrah as matters of logistics, data, transportation, tourism, security, or urban administration, while their findings nevertheless bear directly on the technological mediation of Muslim devotional life. This article therefore conceptualises digital Islam not as a static or fully cohesive field, but as an evolving interdisciplinary discourse in which theologians, social scientists, technology researchers, anthropologists and experts in management sector collectively shape the study of Muslim religious experience in digital contexts.

The field of “digital Islam” is visible in the platforms that now organise Hajj and Umrah. The Ministry of Hajj and Umrah, for instance, provides regulations, permit information, booking procedures, and official guidance. Such platforms serve purposes beyond mere administration. They establish a digital framework that links pilgrims, holy cities, service providers, and governmental entities through systems of verification, access, mobility, and governance. They illustrate how Islamic pilgrimage is progressively mediated before, during, and after physical arrival. This is a significant change in pilgrim experience today.

This study does not present novel ethnographic, interview-based, or quantitative data. Rather, it critically engages existing scholarship, policy materials, and technology-focused studies to interpret how platforms, QR-code systems, smart urban services, and app-based governance increasingly structure the pilgrimage experience. The Nusuk platform is treated as a contemporary case study because it exemplifies the growing centrality of platform-based governance in large-scale crowd gatherings. Nusuk is the official digital platform managed by Saudi Arabia’s Ministry of Hajj and Umrah, designed to facilitate Hajj and Umrah services, covering registration, package selection, permits, booking, payment, guidance, transportation coordination, and access to related pilgrimage services.

For the purposes of this study, “digital barriers” refers to the technological, procedural, linguistic, relational, and infrastructural obstacles embedded within digitally mediated pilgrimage systems that condition meaningful access to sacred participation. These include interface complexity, authentication requirements, platform dependency, limited

digital literacy, reliance on intermediaries, and related constraints that shape autonomy, dignity, and inclusion within a given space. The term is used throughout as a concise way of referring to these overlapping challenges. In this article, “digital barriers” are treated not merely as technical inconveniences but as ethical and theological conditions that mediate participation in pilgrimage itself. Likewise, “ethical infrastructure” denotes the social, technological, institutional, and to a certain extent theological conditions that facilitate, restrict, or dignify access to sacred participation. This implies that these platforms transcend mere administrative functions; they constitute integral components of the moral framework through which pilgrims engage with, navigate, and participate in sacred space.

2. Conceptualising a Digital Theology of Pilgrimage and Space

Throughout the text, the term “digital theology of pilgrimage” is used to articulate a theological framework that examines how digital systems shape access to sacred space, ritual participation, authority, and religious meaning, while also asking how such systems might be governed in light of faith commitments. While “digital theology of pilgrimage” has not yet emerged as a concrete discipline within digital theology and religion, the concepts of “virtual pilgrimage” and the rapid integration of technology within religious tourism have been the focus of many scholars. Hlad et al. (2026) explore “virtual pilgrimage” from a theological and pastoral perspective as a “sign of the times,” calling the Church towards new modalities for pastoral engagement. Tran and Davies (2025) similarly discuss the possibility of a hybrid “authenticity” of virtual pilgrimage, highlighting benefits for persons with disabilities, older adults, and other marginalised communities, as well as the potential for more inclusive global participation and broader attendance. In doing so, they challenge preconceived notions of “place” and explore how it can be renegotiated in the digital realm to support an authentic pilgrim experience (Tran and Davies 2025).

Conversely, scholars in religious tourism document the growing integration of digital components, including virtual and augmented reality and social media, to complement the pilgrim experience (Berry 2025; Tyagi et al. 2025). While scholarship in digital theology and virtual pilgrimage effectively examines how sacred space is negotiated within digital settings, and discussions within religious tourism show great concern for the impact of the digital on the visitor experience in terms of marketing and engagement, logistics, and security, a gap exists in the analysis of how physical sacred space is mediated by technology, particularly in terms of authority, access, and social exclusion. Thus, a more holistic approach to a “digital theology of pilgrimage”, or more accurately, “a digital theology of pilgrimage and space”, is required to address the ways technological mediation simultaneously expands and constrains access to sacred space(s), shaping new forms of participation, exclusion, and religious authority. Therefore, the paper aims to offer a critical framework through which to examine how digital mediation reshapes the theological, social, and spatial conditions of pilgrimage in contemporary religious life more broadly.

3. The Haram Reconfigured: Digital Infrastructure and the Nusuk Platform

Within the Islamic tradition, the Haram is not merely a physical destination; it is a sacred zone governed by ritual rules, legal norms, historical meanings, and embodied practices². Its sanctity depends on more than architecture. It is experienced through embodied movement, intention, collective worship, and submission to divine order. Yet today it is also a high-density managed environment, supported by surveillance, mobility coordination, transport systems, identification confirmations, booking platforms, and interface-based service deliveries (Alshattnawi 2013; Saudi Press Agency 2025; Shah 2024; Mantoro et al. 2012; Alsagaf et al. 2015;). This dual character matters. Smart systems increas-

ingly facilitate encounters with the H̥aram, which remains a sacred space (Showail 2022; Felemban et al. 2020). Pilgrims may receive location-sensitive reminders, use electronic permits, access digital certificates, rely on app-based scheduling, or encounter QR-coded information systems. Earlier proposals in Hajj-related technology literature envisioned smartphone systems to track pilgrims, send alerts at specific locations such as Arafah, Muzdalifah, or Mina, and provide foundational training for rituals (Mantoro et al. 2012; Khan and Shambour 2018). Other studies proposed QR-based identification systems, electronic tourist guides, GPS tracking, and biometric or encrypted access models to improve safety and authentication (Alshattnawi 2013; Shambour and Gutub 2021). These developments reflect a broader trajectory in which digital infrastructures and data-driven systems reorganise the experience of pilgrimage, increasingly mediating access, embodied movement, and ritual performance (Binsawad and Albahar 2022; Kasim 2026).

These innovations respond to real challenges. Hajj is one of the largest annual mass gatherings in the world. Crowd control, health risks, identification of lost pilgrims, multilingual communication, and emergency response remain persistent concerns. Studies on Hajj crowd simulation and evacuation modelling, further underline the exceptional complexity of the pilgrimage environment, especially given age diversity, language barriers, site-to-site movement, and the recurrence of crowd-related incidents (Alshattnawi 2013; Saudi Press Agency 2025; Shah 2024; Mantoro et al. 2012; Alsaggaf et al. 2015). In this context, technological systems can save lives and improve logistics. Yet the same systems also transform the meaning of participation. The pilgrim is no longer simply a worshipper moving through a sacred landscape; the pilgrim becomes a user, data subject, account holder, authenticated traveller, and managed body within a digital system. This transformation is especially consequential for elderly pilgrims, who may experience a mismatch between the spiritual logic of pilgrimage and the procedural logic of digital governance (Saudi Press Agency 2025).

In present-day pilgrimage, digital mediation shapes how pilgrims prepare, travel, orient themselves, learn rituals, document experiences, and access support, except in cases of exclusively livestreamed or virtual participation. Research on pilgrimage in classical and historical contexts emphasises that these sacred sites are regarded as manifestations of divine presence, where ritual practices foster humility, spiritual renewal, and a profound sense of belonging to God (Çevik 2025). However, the modern pilgrim no longer approaches sacred space free from digital mediation. While intention, or ‘niyyah’, a theological construct, originates internally, access to the sanctuary increasingly begins before physical presence, through digital spaces facilitated by mobile applications. For instance, Nusuk now functions as more than an informational tool: it can serve as a gateway for booking permits, verifying identity, receiving ritual guidance, and accessing digital certificates (Alshattnawi 2013). In practice, this means that a pilgrim may encounter digital barriers built into platform-based access requirements, such as authentication protocols, interface navigation demands, and verification systems. For older pilgrims, these steps can become a real obstacle when mobile access, digital literacy, or language proficiency is limited.

The Nusuk platform’s recent developments exemplify the above-stated transformation, as the pilgrimage experience is now digitally documented and symbolically reconstructed through electronic certification systems, thereby incorporating the ritual journey into a broader framework of digital governance (Saudi Press Agency 2025). Authorities increasingly rely on tracking, categorisation, and real-time surveillance to control the movements of millions of pilgrims. This emphasises the logistical necessity of technological integration in one of the world’s most significant annual religious events (Shah 2024). These features are further supported by tracking systems designed to monitor pilgrim movement

and reduce the risks of loss, injury, and disorientation in intensely crowded settings (Mantoro et al. 2012). We therefore understand these rapid transformations as marking a shift from pilgrimage as a primarily embodied ritual to pilgrimage as a digitally governed process. Such systems frequently operate with insufficient attention to age, physical limitations, or diverse levels of digital literacy.

Recent Hajj technology research provides concrete examples of this shift. QR-code systems have been proposed and used for pilgrim identification, emergency response, navigation, health support, and access to service information. Sheikh's QREAM model, for instance, proposes a QR-code emergency assistant designed to help identify pilgrims, connect them to supervisors or medical assistance, and provide support when pilgrims are lost or in medical distress (Sheikh 2025). Similar Hajj applications propose QR codes, electronic bracelets, GPS tracking, SOS mechanisms, wireless sensor networks, and mobile guidance systems to organise movement and respond to emergencies. These technologies reveal how the pilgrim is increasingly embedded in a technical environment in which identity, movement, vulnerability, and care are managed through scannable codes, location systems, and platform-based data.

This transformation also belongs to the wider smartification of Makkah as a pilgrimage city. Studies on post-pandemic urban management show that digital and smart technologies were deployed to regulate crowds, verify health status, restrict access to authorised pilgrims, and support the safe recovery of religious and socioeconomic activities after COVID-19 (Aina et al. 2023). Context-aware QR-code systems in Saudi smart governance similarly illustrate how QR codes can move beyond static labels and become adaptive interfaces that deliver role-specific information to authorities, emergency responders, visitors, and service providers (Alzahrani 2026). These examples support the claim that pilgrimage is no longer mediated only by religious guides, manuals, or communal memory. It is increasingly organised through smart infrastructures that classify, verify, direct, and govern pilgrims in real time.

While many pilgrimage sites within the Judeo-Christian landscape, such as the Vatican and St Peter's Basilica, utilise digital tools—including online ticket reservations, timed entry slots, and apps (Vatican Museums 2026; Vatican 2026)—there is currently no holy site that mediates participation through a centralised platform to the extent of the pilgrimage application Nusuk. This makes it a compelling case study for understanding how digital infrastructures reshape religious practice and what future models of pilgrimage management may look like. Research on pilgrim tracking and support already highlights that older pilgrims, including those with cognitive impairments, face heightened challenges when navigating both physical and technological landscapes (Mantoro et al. 2012, pp. 11–29).

The question is not whether to use technology, but how it redistributes agency, religious access, and vulnerability. By focusing on ageing pilgrims, the paper highlights a key tension of the contemporary sacred city: the Haram is open to the global ummah in principle, yet in practice access is increasingly filtered through systems that reward technological fluency. The study thus contends that the digitalisation of pilgrimage produces a redefinition of sacred space, agency, and access, with particular implications for ageing pilgrims whose limited digital literacy exposes them to vulnerabilities within these emerging systems.

4. Ageing, Inequality, and the Digital Ethics of Pilgrimage

Studies demonstrate that older adults are disproportionately marginalised by the digital divide (Friemel 2016); and that this marginalisation is intensified by intersecting sociodemographic factors, including education, income, gender, disability status, and geography (Fang et al. 2019). At the same time, evidence suggests that when conditions of

access, literacy, and support are met, technology can promote community belonging, social participation, and inclusion among older adults (Delello and McWhorter 2017). The balance depends on a holistic approach to technology integration that is intentionally mindful of bridging existing gaps including, user interface design, so that older adults are not inadvertently excluded from participation in any aspect of spiritual life (Blackmer 2025). The foundation for such a moral imperative is deeply rooted in sacred texts across the world's religions, which consistently promote respect, honour, care, and the preservation of the wisdom of elders (Exod 20:12; Eph 6:1–3; Lev 19:32; Prov 16:31; Qur'ān 17:23–24; 31:14; 46:15; 4:36; 24:58; 16:70). In this context, digitally mediated pilgrimage risks disproportionately marginalising older adults, particularly those at the intersection of multiple inequalities, if barriers to access, literacy, and support are not addressed.

Ageing pilgrims occupy a central but often underexamined place in pilgrimage studies. Many are older adults who have waited years, sometimes decades, for the financial, familial, or national opportunity to perform Hajj or Umrah. Some arrive with health conditions, mobility limitations, low formal education, or minimal prior experience with smartphones and app-based systems (Ministry of Hajj and Umrah 2026). Often, they encounter overlapping digital barriers, where technological, linguistic, procedural, and informational demands converge to shape access to participation. Digital literacy gaps can alter dignity (karāma), autonomy, and ritual confidence. An older pilgrim who cannot navigate an app may miss transportation details, fail to access booking records, misunderstand timing requirements, lose contact with guides, or become vulnerable to misinformation or exploitation. Such a platform designed for seamless self-service may assume capacities that not all pilgrims possess at the user level. In such cases, technology reproduces inequality by favouring those who are younger, more educated, more connected, and more digitally fluent.

The concept of the “grey digital divide” deepens this analysis. Mubarak and Suomi note that older adults face digital exclusion that extends beyond access to devices or internet connectivity. It also involves skills, software design, hardware quality, health limitations, social support, and trust in digital information (Mubarak and Suomi 2022). This issue is directly relevant to ageing pilgrims, because a pilgrim may own a smartphone and still struggle to navigate the layered digital barriers embedded within contemporary pilgrimage platforms. The problem, therefore, is not simply whether older pilgrims possess devices, but whether digital systems are designed around their pace of learning, physical limitations, language needs, and dependence on trusted intermediaries. The experience of the older pilgrim is often shaped by mediation through family members, group leaders, Hajj officers, or technical assistants. An older pilgrim may rely on another person to recover a password, interpret a notification, access a permit, confirm timing instructions, or complete an app-based procedure. What appears to be a seamless self-service system may conceal real dependence on others. This dependence is not merely practical; it can affect autonomy, confidence, privacy, and ritual dignity. In such cases, the digital divide becomes embodied within the pilgrimage itself, since the ability to move through sacred space is conditioned by digital fluency rather than devotional intention alone.

Digital systems also increasingly shape the experience through interfaces as stated above. A pilgrim may spend substantial time interacting with a phone screen: retrieving documents, checking package details, reading notifications, navigating routes, or resolving technical difficulties. For younger or digitally fluent pilgrims, the experience may be manageable. For older pilgrims, attention may be fragmented and their immersion reduced. The sacred environment becomes harder to inhabit when access to services depends on constant mediation through unfamiliar “mediums.” Moreover, this decontextualisation mirrors current tensions within digital religion scholarship regarding the impact of digital

mediation on embodied presence (Chow and Kurlberg 2020). As ritual and guidance are translated into apps and online content, they may be detached from communal and embodied contexts. Religious practice becomes easier to personalise but also easier to isolate from shared oversight and interpretive guidance. This whole reliance on technology can weaken the connection between ritual form and communal meaning, particularly when the pilgrim's main source of instruction is technological rather than relational (Khan and Shambour 2018; Shambour and Gutub 2021; Fathonah et al. 2024).

The digitalisation of pilgrimage prompts profound theological questions. Within Islamic theology, intention (*niyya*) and embodied practice of prayer (*'ibāda*) are fundamental to the legitimacy of ritual. Therefore, the use of digital systems to access rituals therefore complicates the relationship between pilgrims' intentions and their actual actions. In the case of Hajj and Umrah, these technologies do not merely assist the journey; they structure its conditions of possibility (Showail 2022; Binsawad and Albahar 2022; Hamzi 2026; Beard 2024). The aforementioned platform exemplifies this shift. It brings together booking, identity checks, visa processes, transportation, lodging, permits, and other services into one digital ecosystem. While this platform may be helpful from a service perspective, it means that pilgrimage increasingly begins before physical movement, in a digitally regulated environment where access is conditioned by technological competence. Consequently, a pilgrim may arrive at the sacred centre only after navigating registration interfaces, one-time passwords, device requirements, digital payment systems, and app-based confirmations. This marks a significant shift: pilgrimage is no longer only an embodied ritual journey but also a digitally governed process (Showail 2022; Albalawi et al. 2023).

This transformation raises an urgent question: who suffers when digital systems mediate sacred access? Our study suggests that ageing pilgrims are among the most affected. While digital infrastructures are often justified in terms of efficiency, safety, and administrative coordination, they frequently presume levels of literacy, dexterity, language proficiency, and device access that many older pilgrims do not possess. As a result, the "digitalisation of pilgrimage" risks producing new exclusions within spaces that are theologically imagined as open to the global Muslim community. The article, therefore, examines pilgrimage in the Haram as an emerging ethical-digital assemblage in which ageing pilgrims are among the most affected, and where sacred access is increasingly shaped by digital media of technical competence, procedural compliance, and platform governance (Kasim 2026; Haidar and Satifa 2023; Shambour and Gutub 2021).

The use of digital technologies in pilgrimage has altered forms of ritual action, guidance, and participation. Pilgrims' participation, their connections with one another, and their understanding of faith all reflect this change. Technology, through live streaming from Mecca, social media posts, and apps, has changed the way pilgrims participate in rituals and prayer. It has also changed how pilgrims interact with each other and how they understand their faith. As a result, technology has clearly altered how pilgrims act and perform. These questions suggest the need for a digital theology of pilgrimage and a theology of ageing that carefully examines how technology is used. From our perspective, digital systems can be both helpful and limiting. They make things easier and safer, but they also change the way pilgrimage is experienced. The difficulty lies in navigating this tension ensuring the ritual's core remains historically and traditionally intact while still welcoming the potential of technological advancement (Fathonah et al. 2024; Hamzi 2026; Beard 2024).

In this altered context, older pilgrims find themselves in vulnerable situation. Research on Hajj demographics reveals that a substantial number of pilgrims are older adults, due to national quotas and the cyclical nature of religious obligations. These pilgrims frequently encounter difficulties stemming from language obstacles, physical limitations, and

technological deficits (Osman et al. 2015). Research on “elderly-friendly” Hajj programmes further shows that the needs of older pilgrims are already recognised within contemporary Hajj management. A recent study of Indonesian pilgrims highlights “Elderly Friendly Hajj” programmes that include wheelchair-accessible transportation, senior-friendly lodging, special waiting rooms, reduced ceremonial exhaustion, geriatric consultation, health supervision, and tailored manāsik guidance for older pilgrims (Uyuni and Adnan 2024). These measures are not merely administrative accommodations. They reflect the Islamic legal principle of rukhsah, namely leniency or facilitation in worship where age, illness, or bodily limitation creates hardship. The same ethical logic should apply to digital systems. If physical rituals are adjusted to preserve dignity and enable worship, then digital procedures should also be designed to reduce hardship rather than intensify it. These requirements often exceed the abilities of many elderly pilgrims, leading them to rely on knowledgeable companions or intermediaries. This dependence goes beyond practical needs; it also affects the pilgrim’s sense of self. It changes their role from active participants to assisted individuals within a technology-driven yet sacred environment.

The inability to use digital systems can sometimes lead to exclusion from certain ritual spaces or experiences. Cognitive disorders such as dementia, which are more prevalent in older populations, exacerbate the situation and heighten vulnerability in densely populated settings. The digital transformation of pilgrimage interacts with age-related vulnerabilities, resulting in a multifaceted form of exclusion that encompasses both technological and physical dimensions (Mantoro et al. 2012).

5. Digital Governance and the Reconfiguration of Authority

In digital religion, authority is best understood as decentralised, emerging through patterns of interaction rather than through fixed institutional structures. This shift is closely tied to what Campbell describes as “networked community”, a concept that captures the fluid and evolving nature of social relationships in digitally mediated environments. Within such communities, religious authority is not confined to geographic or hierarchical boundaries but is negotiated across distributed networks of participation (Campbell and Bellar 2023; Zafar and Blackmer 2025). Yet this decentralisation is not absolute. In contexts such as pilgrimage, processes of modernisation and digitalisation re-centre authority within technological systems, where access to sacred practice is increasingly facilitated by state-regulated platforms and digital infrastructures, inadvertently creating barriers to participation and exacerbating the digital divide. In light of the moral imperative found across sacred traditions to honour, care for, and include older adults, barriers to participation emerge not merely as technical challenges but as deeply theological concerns that demand thoughtful scholarly and ethical response (Blackmer 2025).

As introduced in Section 2, the ḥaram has traditionally been understood as a sacred area marked by divine presence, ritual restrictions, and a sense of symbolic unity, paralleling the logic of bounded sacred space expressed in Exodus 19:12–13. Its meaning has been maintained through embodied practices and the shared memory of the ummah. Historical and architectural studies emphasise that both al-Masjid al-Ḥarām and al-Masjid al-Nabawī evolved gradually, expanding in response to communal needs while retaining their symbolic centrality for Muslims worldwide. However, digital infrastructures now introduce a new layer of mediation that reshapes how these spaces are accessed and experienced by pilgrims. QR codes, for example, function as access control devices that convert ritual participation into digital formats that people can scan, observe, track and identify. Research on QR codes in religious tourism suggests that these systems transform ritual practice into programmable and standardised procedures, thereby reducing reliance on textual or communal direction (Alshattnawi 2013; Saudi Press Agency 2025; Shah 2024; Mantoro et al. 2012).

This shift produces a *re-centralisation of authority*: where once knowledge of ritual was transmitted through human guides, familiar companions, or prior personal experience, it is now increasingly embedded in handheld devices. The sacred space thus becomes legible not through embodied familiarity but through digital interface navigation. The pilgrim must “read/receive” the ḥaram through screens, prompts, and verification signals. From a theological perspective, this raises important questions: when pilgrims mediate sacred space through interface systems, do technological systems assume the role of religious authority, overshadowing tradition and community. The sacred sanctuary, therefore, becomes a space not only of divine presence but also of digital control, where access hinges on digital literacy and algorithmic protocols (Mantoro et al. 2012).

The sheer magnitude of Hajj presents considerable logistical difficulties as millions of pilgrims move through confined areas within a restricted timeframe. Technological solutions, including crowd monitoring systems, anomaly detection algorithms, and transport management models, are designed to address the hazards associated with overcrowding and potential accidents (Shah 2024). Research on pervasive tracking environments further underscores the need for real-time monitoring of pilgrim movement, especially given the prevalence of missing persons and crowd-related incidents. Similarly, mobile-based systems like “Easy Hajj” (Osman et al. 2015) propose GPS-enabled guidance and SMS alerts to ensure that pilgrims perform rituals at the correct time and place. We observe that these systems do more than facilitate movement; they reorganise it. Pilgrimage is transformed into a regulated process that supersedes the spontaneous, personal pilgrimage experience. Time slots, verification checkpoints, and categorised transportation networks introduce bureaucratic order into the very fabric of ritual practice. Consider, for instance, proposed colour-coded identification systems in the Nusuk app; these categorise pilgrims based on their status, origin, and physical condition, thereby structuring movement through visual and administrative hierarchies (Shah 2024). Their algorithmic processes reflect a wider trend toward algorithmic governance, wherein technological systems make decisions regarding access, movement, and participation. Although these systems improve coordination, they also introduce novel forms of control that fundamentally alter the intention of pilgrimage.

These developments reveal that the digitalisation of pilgrimage is not merely a matter of efficiency or coordination but a reconfiguration of how the sacred is encountered and understood. Platforms, interfaces, and algorithmic systems increasingly structure ritual movement, conditioning participation on one’s ability to navigate these technologies. While such systems may enhance safety and organisation, they also risk reproducing existing inequalities by privileging those who are digitally fluent and resourceful. For ageing pilgrims in particular, this shift introduces new forms of dependency and exclusion, as access to ritual practice becomes mediated through unfamiliar and often inaccessible tools. Authority over the sacred is, therefore no longer negotiated solely through traditional authority or community but is increasingly embedded within digital infrastructures that regulate participation, raising significant ethical concerns as older adults are disproportionately excluded from full engagement.

6. Safety, Surveillance, and the Tensions of Care in Digital Pilgrimage

The digitalisation of pilgrimage is frequently justified in terms of safety, efficiency, and care. These are serious concerns, since crowd disasters, lost pilgrims, medical emergencies, permit forgery, and communication breakdowns, are well-documented challenges. Proposals involving tracking, QR identification, wristbands, encrypted authentication, and data-driven monitoring all respond to the need for safer pilgrimage management (Mantoro et al. 2012). At the same time, the literature raises ethical concerns about

privacy, ownership, access to data, and the risk that tracking technologies resemble intrusive surveillance. One Hajj systems study explicitly notes that tracking and monitoring can resemble spying, and points to ethical concerns involving privacy, accuracy, property, and accessibility (Mantoro et al. 2012). These concerns are especially relevant for older pilgrims, who may consent to technologies without fully understanding how data is collected, used, stored, or shared. The Nusuk terms and privacy policy reinforce this issue.

The platform involves personal data processing, cookies, tracking technologies, on-line reservations, identity-linked accounts, health-related data, payment systems, and data sharing with service providers and related entities (Ministry of Hajj and Umrah 2026). While this may be administratively necessary, it also means that participating in pilgrimage increasingly entails entering a datafied ecosystem. For pilgrims with limited literacy, meaningful consent becomes difficult. They may formally accept terms without being able to understand them, thereby raising an ethical tension between care and control. A system may be designed to protect pilgrims, but if it introduces digital barriers through opaque compliance requirements and inaccessible data practices, then safety comes at the cost of autonomy and privacy. Unfortunately, when analysis of digital justice is constrained exclusively to concerns of safety, data, and privacy, ageing is rarely considered in relation to the access and use of digital tools (Evangelische Kirche in Deutschland 2022, 104, 156–93; Blackmer 2025). Ethical pilgrimage governance should therefore ensure that protective technologies are proportionate, transparent, and understandable—especially to vulnerable populations.

Islamic discussions of digital ethics sharpen this ethical tension between care and control. Recent work on Islam, big data, and digital ethics argues that digital technologies in Muslim contexts should be evaluated through Islamic core values such as justice, honesty, kindness, privacy, trust (*amāna*), dignity, and social responsibility (Saputra and Asbi 2025). In the present study, such an approach means that the collection, processing, and sharing of pilgrims' personal data cannot be treated as a purely technical matter. Identity-linked accounts, health information, location tracking, and related systems all involve entrusted information. From an Islamic ethical perspective, data governance must therefore be transparent, proportionate, and oriented toward the protection of individuals rather than administrative efficiency alone.

This point is especially significant for ageing pilgrims. Many may accept terms, share documents, or depend on others to operate digital platforms without fully understanding how their data are stored, transferred, or used. The ethical problem is not resolved by formal consent alone if consent is not meaningful, accessible, and understandable. A pilgrimage platform may serve safety and coordination, yet it must also protect privacy, dignity, and autonomy. In short, digital care requires more than technical protection. It requires an ethical framework that treats data as a trust and views vulnerable pilgrims not merely as users of a system but as persons whose dignity must be preserved.

7. Rethinking Pilgrimage as Digital-Ethical Infrastructure

If access to sacred space is increasingly mediated through digital infrastructures, then the conditions of participation in religious life become not merely logistical but theological. Across religious traditions, sacred spaces are understood not only as sites of divine encounter but also as moral environments governed by obligations of care, hospitality, and inclusion. When these spaces are reconfigured through digital systems, the ethical responsibility to ensure just and equitable participation does not disappear; it intensifies. Digital mediation therefore introduces new theological questions: who is able to access the sacred, under what conditions, and at whose expense? These questions demand careful reflection, particularly where

technological systems risk reproducing forms of exclusion that contradict longstanding religious commitments to communal care and moral responsibility.

The traditional Islamic view of pilgrimage places the traveller (*musāfir*) and wayfarer (*ibn al-sabil*) within a moral framework that prioritises care, guidance, and community responsibility, especially for the weak and the elderly. This is also the context in which the question of ritual authenticity emerges in a more historically grounded sense. As stated in *Sūrah al-Nisā'* 4:36, and similarly in *Tawbah* 9:60, which recognises the wayfarer as one of the legitimate recipient of care and resources, this ethical viewpoint is based on the normative principles of the Quran, which expressly require support for the wayfarer alongside familial and social obligations. Additionally, Qur'ānic discourse on pilgrimage, particularly in Q 2:196–197 and Q 22:27, describes *hajj* as a communal act grounded in moral discipline, mutual aid, and awareness of human limitations³.

Within Islamic ethical thought, the assessment of pilgrimage technologies should be shaped by the higher objectives of the *Sharī'a* known as *Maqāṣid al-Sharī'a*. These include the preservation of religion (*ḥifẓ al-dīn*), life (*ḥifẓ al-nafs*), intellect (*ḥifẓ al-ʿaql*), property or resources (*ḥifẓ al-māl*), lineage and social continuity (*ḥifẓ al-nasl*), and, in many contemporary formulations, dignity and honour (*ḥifẓ al-ʿird* or *karāma*). In relation to digital pilgrimage, these objectives require that technological systems be judged not only by administrative efficiency but also by their capacity to preserve worship, protect life, reduce hardship (*rafʿ al-ḥaraj*), promote public benefit (*maṣlaḥa*), and sustain the dignity of vulnerable pilgrims.

This *Maqāṣid*-oriented perspective is already visible in contemporary debates on Hajj governance. Studies on repeated Hajj, as discussed earlier, argue that *Maqāṣid al-sharī'a* can support policies that prioritise first-time pilgrims, reduce excessive waiting periods, protect elderly pilgrims from heightened health risks, and promote a more equitable distribution of access to pilgrimage (Husen and Mukhlisin 2024). Such arguments are relevant beyond repeated Hajj. They demonstrate that pilgrimage governance must take into account not only individual aspirations but also communal welfare, health vulnerabilities, equity, and the conditions under which the obligation can be fulfilled. Applied to the Nusuk era, the same logic suggests that digital systems should not become a new layer of exclusion. If access to permits, transport, accommodation, ritual timing, or identity verification depends on digital literacy that many older pilgrims lack, then the system risks undermining the *Maqāṣid* it claims to advance.

Digital pilgrimage must therefore be evaluated through a double *Maqāṣid* framework: *Maqāṣid al-Sharī'a* clarifies the ethical obligations of access, safety, dignity, and hardship removal, while *Maqāṣid al-Aqida* clarifies whether digital mediation remains faithful to the theological truth of pilgrimage as embodied worship before God (cf. Abdelnour 2022). A *Maqāṣid*-based approach would require pilgrimage platforms to include simplified interfaces, multilingual voice guidance, human help points, non-digital fallback procedures, transparent data policies, privacy-by-design, and special support for elderly pilgrims. Such measures would not be optional conveniences. They would form part of the ethical obligation to ensure that digital sacred governance remains aligned with the purposes of ritual, the protection of life, and the removal of unnecessary hardship.

The *ḥaram* itself, as a sanctuary, embodies this ethic of easing the pilgrim's path through collective support and conventional guidance. By contrast, if the contemporary pilgrimage experience depends on digitally sequenced reminders, verification systems, and platformed access, then pilgrimage becomes increasingly entangled with technical infrastructures that relocate responsibility onto the individual user. This transformation introduces a subtle but significant disjunction between inherited ethical commitments and contemporary practices, as the burden of navigation, compliance, and participation shifts

from being shared to being individualised according to technological competence (Showail 2022; Kasim 2026; Shambour and Gutub 2021; Hamzi 2026).

A parallel ethical framework emerges within the Judeo-Christian tradition, where care for the elderly is consistently articulated as a divine mandate rather than a social preference. Biblical texts command not only respect but also active provision for older adults, extending honour beyond the family unit to the broader community (Exod 20:12; Lev 19:32; Prov 16:31). Within this framework, ageing is associated with wisdom, dignity, and continued participation in communal and spiritual life, rather than decline or marginalisation. Consequently, any system that conditions access to religious practice upon technological literacy risks undermining these theological commitments by introducing barriers that disproportionately affect older adults. The ethical obligation, therefore, is not simply to provide access but to ensure that systems of participation uphold the dignity, autonomy, and inclusion of those most vulnerable to exclusion (Blackmer 2025).

In response to these difficulties, our study suggests rethinking pilgrimage sites as ethical rather than digital infrastructures. This perspective emphasises care, accessibility, and inclusion, rather than efficiency and control. An ethical infrastructure acknowledges the inherent non-neutrality of technological systems are not neutral and that they incorporate normative assumptions regarding their users. Within the pilgrimage context, these assumptions often favour individuals with digital literacy, mobility, and linguistic proficiency, thereby inadvertently marginalising older pilgrims.

Reframing pilgrimage as an ethical infrastructure therefore require a deliberate reorientation of design, governance, and implementation toward principles of justice and inclusion. Technologies that serve access to the sacred must be evaluated not only by their efficiency but also by their capacity to embody the moral commitments central to religious tradition—namely, the protection of the vulnerable, the preservation of human dignity, and the facilitation of meaningful participation for all. Without such intentionality, digital systems risk transforming sacred access into a conditional privilege rather than a shared religious right, thereby contradicting the very ethical foundations they are meant to support.

It may be argued that digital pilgrimage systems improve safety, reduce administrative confusion, prevent overcrowding, and assist pilgrims who might otherwise struggle to navigate complex logistical demands. This is a serious and valid point. Hajj and 'Umra involve immense challenges in crowd management, health protection, transportation, identification, language diversity, and emergency response. Digital platform-based coordination can therefore save lives, reduce delays, and make large-scale pilgrimages more manageable (Sheikh 2025; Aina et al. 2023). Yet these benefits do not remove the ethical problem if the same systems create new barriers for older adults or for those lacking digital literacy. A system can be both protective and exclusionary at the same time. This is precisely why its governance must be assessed through theological as well as technical criteria.

8. Conclusions: Toward a Digital Theology of Pilgrimage and Ageing

A more just pilgrimage future requires moving beyond innovation narratives toward inclusive design and hospitable management. The question is no longer whether the sacred journey will be digital. It already is. The real question is whether this digital sacred journey will remain accessible, humane, and dignified for those who come to the Hāram in faith, even if they are not necessarily technologically fluent. Ageing pilgrims are among those most affected by this transformation. Their participation is often complicated by layered digital barriers that intersect with age-related vulnerability. What emerges is a layered form of exclusion in which the inability to navigate digital systems can diminish agency, undermine dignity, and in some cases obstruct meaningful access to ritual and

sacred spaces. The digital divide thus becomes not only a social issue but also a religious one, because it shapes who can move confidently through sacred space and who cannot.

This paper has argued that the Haram must now be understood not only as a sacred destination but also as an ethical-digital infrastructure. Building on these findings, the central concern is how these systems are designed and governed in practice. They must be designed and governed in ways that respect the religious significance of the journey and the dignity of those who undertake it. If sacred space is increasingly mediated through digital systems, then inclusion, accessibility, and care must be treated as core theological and ethical responsibilities rather than secondary administrative concerns.

It follows that a digital theology of pilgrimage and ageing must affirm three inter-related commitments: first, that inclusion is a theological mandate, requiring that ageing pilgrims are not excluded by the very systems intended to facilitate the journey; second, that digital infrastructures are not neutral but sites of authority that must be governed with transparency, accessibility, and justice; and third, that pilgrimage remains an embodied and communal act, requiring the preservation of relational forms of guidance and care alongside technological systems. These commitments reframe digital mediation not as a substitute for the sacred, but as an obligation to ensure that access to it remains genuinely open, dignified, and shared across all stages of life.

The digital divide shapes who can move confidently through sacred space and who may require assistance to do so. A digital theology of pilgrimage and ageing must affirm that technological competence cannot solely determine access to the sacred. If digital systems are now part of the pilgrimage journey, then their design must embody the ethical commitments of the traditions they serve: justice (‘adl), mercy (rahma), dignity (karāma), public benefit (maṣlaḥa), removal of hardship (raf‘ al-ḥaraj), and meaningful participation across all stages of life. In this sense, the central question is not whether pilgrimage should be digital, but whether digital pilgrimage can remain humane, accessible, and theologically feasible.

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Notes

- ¹ While our study focuses on the digital mediation of pilgrimage through existing platforms and infrastructures, it is important to acknowledge emerging developments in which artificial intelligence is increasingly deployed within tracking systems, application interfaces, and data-driven management of pilgrim activities. These developments raise important questions regarding the transformation of pilgrimage as both ritual practice and embodied experience, particularly in relation to agency, authorship, and meaning-making. cf. Hashemi et al. (2024); Youvan (2024); Beard (2024); Hamzi (2026).
- ² A similar logic of bounded sacred space appears in the Judeo-Christian tradition, as in Exodus 19:12–13, where access to Mount Sinai is carefully regulated in the presence of the Divine.
- ³ Qur’ān 4:36 (“Worship God and associate nothing with Him, and show excellence toward parents, relatives, orphans, the needy, the near neighbour, the distant neighbour, the companion at your side, and the wayfarer [ibn al-sabil]”); cf. Qur’ān 9:60 (“Alms

are only for the poor and the needy ... and for the wayfarer [ibn al-sabil]"); see also Qur'an 2:196–197 ("Complete the pilgrimage [ḥajj] and the visitation [‘umrah] for God ... and take provisions, but the best provision is mindfulness [taqwā]"); and Qur'an 22:27 ("Proclaim the pilgrimage among humankind; they will come to you on foot and on every lean mount, arriving from every distant pass").

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