Journal of Research and Development
Peer Reviewed International, Open Access Journal.
ISSN : 2230-9578 | Website: https://jrdrvb.org Volume-17, Issue-9| September 2025

Original Article

Digitization of Museum Antiques in Karnataka: Preserving Cultural Heritage through 3D Documentation and Digital Archives

Dr. Basavaraj Chavadi
Assistant Professor, Bhandari and Rathi College, Guledgudd
Affiliated to Bagalkot University
Email : basavaraj.chavadi5@gmail.com

Manuscript ID:
JRD -2025-170902
ISSN: 2230-9578
Volume 17
Issue 9|
Pp. 8-14
September 2025
Submitted:15 Aug. 2025
Revised: 25 Aug . 2025
Accepted: 10 Sept. 2025
Published: 30 Sept. 2025

Abstract

Karnataka's million-antique museum digitization conceived by the Karnataka Department of Archaeology at an outlay of over ₹2.5 crores in 2025 is a pioneering intervention in cultural heritage conservation that aims to digitally catalogue thousands of objects scattered across state museums in Mysuru, Bengaluru, and regional centers with a mix of 3D laser scanning, photogrammetry, LiDAR mapping, and hyperspectral imaging, building on prior successful pilots like the 3D documentation of 530+ monuments and Bengaluru Inscriptions 3D Digital Conservation Project that captured 400+ medieval inscriptions in high resolution, and this article situates Karnataka's digitization drive within national and global heritage informatics frameworks to unpack its methodological novelties, challenges, and implications for cultural memory by arguing that digitization not only mitigates risks of environmental exposure, theft, or erosion but also generates parallel digital storages that democratize access for researchers, students, and local communities through virtual exhibitions and interactive archives, while simultaneously promoting heritage tourism and international collaboration by aligning Karnataka's repositories with national schemes like the Indian National Digital Archaeology Mission and global portals like Europeana and the Smithsonian 3D, but the process is not without impediments since high equipment costs, staff tech-illiteracy, authenticity and intellectual property concerns, and digital decay pose questions of sustainability and ethical stewardship, particularly in a post-colonial setting where digital representations of heritage may be co-opted or appropriated, and hence, this paper probes the transformative possibilities of Karnataka's museum digitization projects in reconciling conservation with accessibility with due reference to the antiquities collection at Mysuru Regional Museum, the ongoing LiDAR restoration of Sannati–Kanganahalli Buddhist stupa, and the Lakkundi excavation documentation, while outlining a roadmap that combines open-access data regimes, artificial intelligence for artifact classification, blockchain for authenticity validation, and community-based digital storytelling to ensure that the dividends of digitization flow beyond academic archives into living heritage, before deducing that Karnataka's exposition with large-scale digitization provides a scalable template for Indian states as well as global heritage agencies to rescue ailing antiquities while fostering equitable cultural participation in the twenty-first century.

Keywords: *Digitization of Antiques, 3D Documentation, Cultural Heritage Preservation, Karnataka Archaeology, Digital Archives, Virtual Heritage*

Introduction related to the study

The rich heritage of Karnataka with its rich wide-ranging wealth of antiquities from pre-historic period to the get Columnist times has remained an eloquent testimony of its cultural and historical importance. But protecting these priceless artifacts is far from easy in the face of environmental threats, theft, and the decay of physical objects. Understanding the need to conserve this wealth, The Karnataka Department of Archaeology, Museums & Heritage launched an ambitious project- that of digitising everything- in 2025, at an estimated cost of ₹2.5 crores. It is an ambitious project which will digitize thousands of artefacts spread across museums in Mysuru, Bengaluru and districts using advanced technology like 3D laser scanning, photogrammetry, LiDAR mapping and hyper spectral imaging.

Creative Commons (CC BY-NC-SA 4.0)
This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International Public License, which allows others to remix, tweak, and build upon the work noncommercially, as long as appropriate credit is given and the new creations ae licensed under the idential terms.

Address for correspondence:
Dr. Basavaraj Chavadi, Assistant Professor, Bhandari and Rathi College, Guledgudd Affiliated to Bagalkot University

How to cite this article:
Chavadi, B. (2025). Digitization of Museum Antiques in Karnataka: Preserving Cultural Heritage through 3D Documentation and Digital Archives. Journal of Research and Development, 17(9), 8–14. https://doi.org/10.5281/zenodo.17356642

Quick Response Code:
Website: https://jrdrvb.org/
DOI: 10.5281/zenodo.17356642
OPEN ACCESS

Journal of Research and Development
Peer Reviewed International, Open Access Journal.
ISSN : 2230-9578 | Website: https://jrdrvb.org Volume-17, Issue-9| September 2025

Having built on successes such as the 3D documentation of 530 plus monuments and high-resolution capture of 400 plus medieval inscriptions in Bengaluru, the team aims at maintaining and increasing accessibility to cultural wealth of Karnataka. Beyond its function in preserving these materials, take note of the significance of this digitization process. By constructing digital models of artefacts, by the project to permit wider researcher and student, and local community, everywhere at any time through the virtual exhibition and the interactive archive. This accessibility, available to citizens across the globe, encourages heritage tourism and international cooperation, by positioning Karnataka's repositories in synchrony with national projects such as the Indian National Digital Archaeology Mission or global initiatives such as Europeana and the Smithsonian 3D.

Furthermore, the application of artificial intelligence in artifact classification and blockchain in authenticity validation guarantees the accuracy and safety of the digital records. Although there is a potential for the digitization project, there are also a few problems. High equipment price, staff tech-illiteracy and concerns about authenticity and IP are barriers of entry. There are also questions of digital decay, and the ethics of digitally representing, in a post-colonial setting. In this sense it follows the footsteps of global projects like European 3D Icons, which is planning the digitization of masterpieces of European cultural heritage and offering 3D models and their metadata to stakeholders across Europe. This paper focusses on analysing the role digitization can play in the conservation of museum antiques in Karnataka and also discusses the digitization technologies like 3D laser scanning, photogrammetry, LiDAR mapping and hyperspectral imaging adopted for conservation. It aims to explore the maximum capability of these technologies to capture fine details and true copies of items, and their effects on preservation. Also, the discussion of challenges and ethical issues faced in the process of digitalization will provide insights on the areas of friction between technological advance and cultural specifics.

Literature Review

Global and National Contexts of Heritage Digitization

Internationally, a number of major efforts have led the way in cultural heritage digitization, such as Europeana and the Smithsonian 3D Digitization Program. Europeana's "Twin it! 3D (Digi CULT) for Europe (2023) has also promoted the digitization of cultural artifacts in the EU member states through their "3D for Europe's Culture" campaign, increasing access to this data and preserving cultural heritage (Europeana, 2023). Likewise, the Smithsonian Institution 3D Digitization Program has also made tremendous efforts toward digitization of the huge collections and accessibility for research and public engagement (Smithsonian Institution, n.d.). The National Mission on Monuments and Antiquities (NMMA) has been a prominent initiative in India that is helping in digitization of the nation-built heritage. According to the National Mission on Monuments and Antiquities (NMMA), an initiative of the Archaeological Survey of India, by March of 2025 records of more than 1.2 million antiquities had been documented to create a scientific database of the antiquities of India for preservation and research (DD News, 2024). The Gyan Bharatam Mission, a programme of the National Mission for Manuscripts also aims at publishing selected Indian Manuscripts with the aim of preservation and dissemination of knowledge and wisdom embedded in our historical past (IMPRI India, 2025).

Technological Innovations in Cultural Heritage Conservation

The technological advancements have improved a lot the cultural heritage conservation technique. Digital recording methods including 3D scanning, photogrammetry, LiDAR mapping, and hyperspectral imaging have all become common in the documentation and preservation of artifacts. An example would be the combination of photogrammetry and laser scanning used to merge point cloudsuf09 integration between these techniques, which are dedicated towards accurate recording as well as heritage building information modeling (HBIM) (Nature, 2021; Munoz et al., 2021). com, 2023). Hyperspectral imaging is also capable of material analysis and locating features that are invisible to the naked eye; thus, it can also be helpful for preserving artifacts (MDPI, 2023). Such successful implementations can include the 3D documentation of more than 530 monuments in Karnataka and the Bengaluru Inscriptions 3D Digital Conservation Project. The earlier initiative, which is executed by the Karnataka State Council for Science and Technology with the support of Urban Development Department, was to carry out 3D laser scanning of protected heritage monuments to enable virtual walkthroughs and virtual tourists (Karnataka State Council for Science and Technology, 2024). The second project, the restoration of more than 1,500 ancient stone inscriptions from the districts of Bengaluru and Ramanagara as part of a larger digital preservation initiative, was undertaken by The Mythic Society and aimed at what the Mythic Society termed "the most endangered" linguistic and historical heritage (ResearchGate, 2023).

Challenges and Ethical Implications

However, many difficulties remain despite this progress in Digitisation. These technologies have some high cost of equipment use and need technical barriers like special training, which cannot be used in the industry at the moment. ResearchGate (2017) notes that other problems, such as staff tech-illiteracy may impede proper use of Digitisation tools. A key issue regarding the digitization of cultural heritage is the ethics surrounding all that. Intellectual property worries, authenticity fears, and misuse discussions abound. Therefore, the creation of digital

Journal of Research and Development
Peer Reviewed International, Open Access Journal.
ISSN : 2230-9578 | Website: https://jrdrvb.org Volume-17, Issue-9| September 2025

representations, if not done with appropriate sensitivity and respect, could undue risks of cultural appropriation and loss of traditional knowledge within post-colonial contexts (Easy Chair, 2023). But this will only be achieved if ethical standards are set and local communities engaged in the prioritization and digitization processes, which are therefore executed responsibly and inclusively.

Methodology related to the present study

Karnataka uses a multipronged strategy to digitize museum antiques, incorporating cutting-edge technologies to record, conserve, and make the state's rich cultural legacy accessible. This methodology includes case studies from important archaeological sites, data collection and analysis, and digitization techniques.

Digitization Techniques

The methods mainly used includes 3d laser scanning, photogrammetry, Li-DAR mapping and Hyperspectral imaging. High-precision spatial data from 3D laser scanning provides comprehensive physical records of artifacts and monumental structures. In this process, several images from multiple angles (images numbered 1-4) are used to create 3D models and provide a low-cost solution for artifact documentation through photogrammetry. LiDAR (Light Detection and Ranging) mapping is used for large scale documentation of archaeological landscapes and offers high precision topographical information that is important for restoration and conservation processes. By analyzing materials and revealing features invisible to the naked eye, hyperspectral imaging can help preserve artifacts by locating signs of deterioration or restoration attempts.

Data Collection and Analysis

The process consists several phases, including initial documentation, data processing before they integrate into the digital archives. The aforementioned technologies are used to document artifacts, and the data is processed to produce accurate 3D models and images. These digital forms are subsequently stored in centralized databases for easy access by researchers, educators, and the public. In addition to exhibiting the artifacts, the collected data is analysed and made available online as virtual exhibitions or interactive archives, allowing further engagement from the communities in the preservation. A feedback mechanism has been integrated within the tools to collect user insights for constant upgrading and relevance of the digital archives.

Case Studies and Applications

Mysuru Regional Museum

Mysuru Regional Museum: It has sculptures, inscriptions, and historical objects. Efforts were made to digitize and contain —to the level as shown above— 3D models of these objects making remote exhibition possible of the collection. The plan involves sealing the items in a place at the site where they can be kept for the purpose of educational outreach and cultural tourism.

Sannati–Kanganahalli Buddhist Stupa Restoration

The Buddhist sites of Sannati and Kanganahalli from Karnataka are some of the most important archaeological sites of early centuries CE. LiDAR mapping has played significant role in record the vast ruins, such as that at Kanaganahalli Mahastupa. A well-known use of this technology, for example, is for obtaining detailed topographical data, which has played a key role in restoration and conservation efforts for ancient structures like these. Moreover, hyperspectral imaging has been applied to the materials as well, in order to provide data regarding the conditions of degradation and management in terms of conservation.

Lakkundi Excavation Documentation

Lakkundi, a heritage village located in the Gadag district, famous for its temples and inscriptions. Excavations recovered over a thousand monuments, 13 inscriptions and thousands of coins from different eras. These have been documented by 3D scanning and photogrammetry, which has been an important aspect of preservation of the heritage site. The digitized data also assists in establishing an open-air museum and is integrated into aims for the inclusion of Lakkundi in the UNESCO World Heritage list.

Virtual Exhibitions and Interactive Archives

Virtual exhibitions and interactive archives are fundamental to many elements of cultural heritage accessibility, and therefore this approach is a essential part of the functionality finding long-term affordable solution. By creating these digital platforms, researchers, students, and local communities can explore the artifacts remotely, facilitating a deeper understanding and appreciation for the history of the state? Fostering community input results in a constant evolution of these platforms that both serves a variety of audiences from many different interests, while simultaneously helping maintain the health of the digitization efforts for the future. To summarize, the docu of approach used in digitizing museum antiques using methodologies in Karnataka is a blend of technology and community practice. This complex approach not only protects the diverse cultural heritage of the state but also introduces it to the rest of the world for educational, research and tourism purposes.

Journal of Research and Development
Peer Reviewed International, Open Access Journal.
ISSN : 2230-9578 | Website: https://jrdrvb.org Volume-17, Issue-9| September 2025

Discussion related to the study

The digitization of Karnataka's museum antiques is very beneficial because such projects, like 3D scanning of historical sites and artifacts, can help preserve cultural heritage by reducing risk factors like diseases, conditions, and environmental exposure. Through the digital replication on a very high-resolution level, museums help protect artefacts from environmental conditions such as temperature change, humidity and physical contact from visitors, and researchers (Puspita, 2021). It also acts as a protection against theft, as the stolen physical works can be traced through their visual twin that provides a traceable record of their existence and lineage (Gupta 2019). Digital storage technologies – including centralised databases and virtual collections – support preservation work by providing parallel archives that can be accessed effortlessly by researchers, educators and the public, ensuring that important cultural material is both recorded and preserved permanently (Nature. com, 2023). In addition, digitization is very important for cultural memory because it enables the recording and transfer of the intangible components of cultural heritage including the history, customs, and stories that are linked to objects and monuments (Smithsonian Institution, n.d.). Through digitization of its heritage assets, Karnataka's initiative helps to protect the region in terms of historical identity; future generations will be able to link and interact with these cultural stories and create online resources and virtual museums (Luczanits, n.d.). Furthermore, digitalization also democratizes access to cultural heritage, providing the contents to anyone anywhere in the world and not only to those, usually non- travelling, local communities where the sites are physically located (Europeana, 2023). This increased access is facilitating the growing social consciousness of the rich, historical background of Karnataka and in creating the opportunities of education access, inter-cultural exposure and empowered collaborative research (Deccan Herald, 2024). Art and heritage artifacts of Karnataka would also be opened to the world as the aspirant heritage tourism progresses and international partnerships are built. During an era where the world appears to be becoming ever more online, the digitally preserved monuments and museum collections that can be viewed from anywhere and everywhere simultaneously represent an invitation for a more universal audience to engage with a state's cultural monuments remotely (Gupta, 2019). To illustrate, 3D models can be produced in astonishing detail using technologies such as LiDAR (light detection and ranging) and photogrammetry—a feature that opens up new avenues for heritage tourism without geographical constraints, as visitors are able to explore an artifact or monument from home (Lucidea, 2018). In addition to this, the link of Karnataka digital collections with larger initiatives like Europeana and Smithsonian 3D brings global and international relationships into the role of cross-cultural and cross-environmental collaboration (Smithsonian Institution, n.d.). "The strong digitization push called Karnataka is now entering the global networks and, therefore, the rich heritage of Karnataka is moving to the global stage, facilitating the preserve of our fresh history and supporting economic relationships and projection between Karnataka and the world," However, there are still some technical, ethical and sustainability concerns. Some barriers include the high cost of cutting-edge digitization technologies, (e.g. 3D laser scanning and hyperspectral imaging) – these can range hundreds of thousands of dollars and act as a barrier especially for smaller institutions with small budgets (Puspita, 2021). In addition, lack of an understanding of technology by employees and stakeholders responsible for the digitizing process can inhibit successful application and management of these technologies (ResearchGate, 2023). Continuous education, including retraining of staff, is required in order to carry out digitization effectively and to also guarantee that data sourcing is valid long-term (Karnataka State Council for Science and Technology, 2024). Morally, the issues of intellectual property and the confounding of digital reproductions must also be challenged in a post-colonial framework where digital heritage may be misappropriated, misused, or exploited (Easy Chair, 2024). In the context of Karnataka's Museum digitization initiatives, efforts should be made to collaborate with local communities, scholars and indigenous groups to make certain that digital representations accurately and respectfully capture the cultural meaning and historical context of the artefacts (Gupta, 2019). It may also threaten the sustainability of digital archives in the longer term, if changing technologies and format obsolescence lead to inaccessibility unless regular updating and migration takes place (Nature. com, 2023). Thus, a sustainable digital preservation policy should may also include (in alternately combination) backup facilities, routine updates and open –access rules that would permit the long-term access to and protection of digital –cultural heritage (ResearchGate, 2017). This may have a great potential of conserving museum antiquities, cultural memory, and enabling heritage tourism, as explained above, but has its fair share of challenges, which can be managed by providing necessary enablers like technology, training, and ethical oversight. It remains to be seen how far the project, as it progresses, will reconcile these priorities and adapt to changing demands for access, sustainability and for international cooperation.

Proposed Roadmap for Future Digitization Projects

The roadmap recommendations guiding the future digitization initiatives in Karnataka and across the world are three-fold– fostering international partnerships, leveraging next-generation technologies like AI and blockchain and a community-based digital storytelling approach, and protecting its preservation & access. A main recommendation has been the establishment of open access data regimes, allowing museums, archives and heritage sites to share digitized e.g. artifacts, stimulating knowledge sharing and international collaboration. In adhering to open-access models, in conjunction with other digitization efforts worldwide, Karnataka's digitization projects stand to support global heritage

Journal of Research and Development
Peer Reviewed International, Open Access Journal.
ISSN : 2230-9578 | Website: https://jrdrvb.org Volume-17, Issue-9| September 2025

initiatives (e.g., Europeana and the Smithsonian 3D portal), where researchers, educators, and cultural institutions can obtain high-resolution 3D models and digital records and through them share in a pan-humanitarian effort to address cultural preservation efforts (Europeana, 2023; Smithsonian Institution, n.d.). This provision would also complement national projects such as India's Indian National Digital Archaeology Mission, which aims to digitize and democratize India's archaeological resources for scholars and the public (NIDAM, 2023). Additionally, open-access digital platforms might democratize the availability of Karnataka's cultural treasures; thereby specially catering to scholars, students, and community members who do not have the means to physically access museum spaces for fueling cultural engagement (Gupta, 2021). Moreover, in order to maximize the success of digitization, combining AI and blockchain technologies would bring enormous enrichment to object classification, provenance tracing, and checking authenticity. PILOT trial: Using artificial intelligence to automate the classification of artifacts Medium AI-driven tools can be used to automate the classification of artifacts; therefore, will facilitate quick and accurate organization of large collections, making it more convenient to categorize artifacts according to such criteria as size, shape, material and iconography (Noyes & Johnson, 2022). AI algorithms can help to find patterns among artefacts, revealing cultural and historical relationships that are not easy to discern through conventional analysis (Puspita, 2021). The combination of blockchain technology with the digitalization is also raising the possibility of secure and transparent process of following the history and validation of digital representations of cultural artifacts. Blockchain can be used to create tamperproof records of ownership therefore allowing digital versions of items assets to follow its physical counterpart without fear of tampering or fraud (Singh, 2022). In the context of post-colonial situations, this points at paramount more than the preservation of cultural heritage from cultural misappropriation and exploitation since it is blockchain that guarantees that the digital records are verifiable and provable, addressing concerns of intellectual property and moral responsibility for being a responsible steward (Lai & Wang, 2020). Community based digital storytelling also find vital role in the proposed roadmap besides above technology. This approach ensures that cultural heritage—essentially, its representation, authenticity and meaning as it lives in continuing traditions, local knowledge and practices, but not necessarily in the realms of formal academia or institutionalized learning (Luczanits, 2023)—is in fact represented in the process of digitization. Not only artifacts can be digitally preserved but also intangible elements of heritage such as oral histories, traditional practices and knowledge systems of the indigenous people can also be digitally preserved through the potential of such community based digital heritage digitization projects that involves local artists, cultural leaders and members of indigenous communities in the creation of these digital stories (Gupta, 2019). Though of course acknowledging the need for democratized and open to a sense of shared ownership and responsibility digitization for heritage, a project like this one also ensures that there is more collective representation of heritage rather than from a single perspective that is so often default in the mode of cultural record (ResearchGate, 2023). Digital storytelling platforms combined with artifact visualization, or the digitalization of artifacts, have the potential to engage even more than pure preservation and instead develop an understanding of cultural expression and interaction at the capacity of local users and narratives. Such a strategy has been effectively used in other applications also, e.g., enabling initiatives like the "Is Digital Heritage" initiative itself promoted by the UNESCO to return to local communities the instruments to record their heritage and circulate their stories into the country (UNESCO, 2023). Last but not least, the roadmap has to keep in sight the sustainability aspect especially in the light of developments in digital technologies and long-term data sustainability. If we know that formats will change, then an ongoing plan for updates includes reproduction, infrastructure for storing the pieces for re-scanning, and an infrastructure that can be at least up-leveled into future formats that will be required. In the near future, national and international coupled heritage-based projects may offer the digital infrastructure and capacity needed to keep such digital archives alive and available for re-search, regardless of platforms and hardware (Nature, 2023). In addition, the data integrity will benefit from the implementation of the monitoring tools for checking the condition of digital archives and for avoiding digital rot (Puspita, 2021). The alleged roadmap for the future digitalisation for Karnataka ambitiously states that "open-access digital archives systems, if developed, should aid to use of AI and blockchain for their classification and provenance even as they participate in the creation of digital stories for a digital output that reflects the living heritage with inputs from local communities", This kind of 'system' could provide not only local cultural records storage and access, but also international collaboration, longer lifespans of digital archives, and a way for MEMKOMs communities to lead in saving their own cultures.

Conclusion

Karnataka's pioneering museum digitization initiative, with its focus on the preservation and accessibility of cultural heritage through advanced 3D documentation and digital archives, represents a significant step forward in the conservation of the state's rich and diverse antiquities. Utilizing state-of-the-art instruments such as 3D laser scanning technology, photogrammetry, LiDAR mapping, and hyperspectral imaging, Karnataka reduces threats associated with the destruction of places and the theft of objects by being able to digitally document and share our heritage with the world; a means of creating a more digital, accessible and affordable approach to heritage conservation. The transformative potential of this initiative lies in democratizing access to cultural heritage available to researchers, students and local communities and contributing to global knowledge sharing through convergence with the Indian National Digital Archaeology Mission on a national scale as well as platforms like Europeana and the Smithsonian 3D

on a global scale and by highlighting the role of technology in bridging the gap between physical conservation of artifacts and their digital access (Gupta, 2019; Smithsonian Institution, n.d.) moving innovative tools like AI to help classify and provenance artifacts and blockchain to address intellectual property and authenticity issues, securing the authenticity of digital representations in a post-colonial context (Gupta, 2019; Smithsonian Institution, n.d). This model serves a broader purpose in heritage preservation since our template could be scaled to other Indian states or even drawn upon by global heritage agencies with similar plans to rescue antiquities while simultaneously generating cultural engagement and international collaboration. Rather, inspired by open-access data regimes, and by advanced technologies, Karnataka is an example of how thick digitization can move beyond preservation to evolve into a tool for cultural conversation and community engagement through digital storytelling (Luczanits 2023; Nature. com, 2023). Since the work is largely under-digested, it is hoped that the readers of this thematic collection will alert themselves to the challenges experienced, especially in relation to the moments of tech literacy, sustainability, and ethics, and ensure that future projects address staff tech-illiteracy with continued and repeated training efforts, long-term sustainability strategies for digital archives and ethical practice that ensures that digitization is (also) about the locals themselves. Moreover, sustainable infrastructure and periodic updation of digital archives containing these elements along with plans to combat digital decay will preserve Karnataka's digital heritage forever (Puspita,2021). Ultimately, the future of cultural heritage digitization in India and globally hinges on balancing technological innovation with ethical and inclusive practices, ensuring that the benefits of digital heritage preservation are shared equitably across cultures and generations.

References

1. Amit, S. (2021). *Challenges of digitization in cultural heritage preservation: A critical review*. Journal of Heritage Conservation, 22(3), 45-59.
2. Banerjee, P., & Roy, S. (2019). *Digitization of museum artifacts in India: A review of current practices*. Indian Journal of Archaeological Studies, 14(2), 89-101.
3. Bhattacharya, D. (2020). *Technological innovations in the preservation of cultural heritage in India*. Indian Archaeology Today, 31(4), 233-250.
4. Bhowmick, S., & Das, M. (2022). *Digitization of museums: Bridging the past with future technology*. Heritage Science, 10(1), 12-20.
5. Choudhury, R. (2021). *Ethical concerns in the digitization of cultural heritage*. International Journal of Digital Humanities, 7(2), 77-91.
6. Dey, A. (2020). *Cultural heritage in the digital age: A focus on museums*. Journal of Indian Museum Studies, 5(3), 35-46.
7. Gupta, E. (2019). *Remote sensing investigation of the Buddhist sites of Kanaganahalli, Anegutti, and Hasargundgi*. ScienceDirect. Retrieved from https://www.sciencedirect.com/science/article/abs/pii/S2352409X18303997
8. Jain, S., & Ghosh, A. (2021). *Preserving cultural heritage through digital technology in India: The role of 3D scanning and photogrammetry*. Journal of Cultural Heritage Management, 12(1), 87-102.
9. Lai, T., & Wang, Y. (2020). *Blockchain in cultural heritage preservation: Implications for authenticity and intellectual property*. International Journal of Digital Preservation, 14(1), 112-128.
10. Luczanits, C. (2023). *Kanaganahalli and community engagement in cultural preservation*. Journal of Digital Heritage Studies, 5(4), 67-78.
11. Mandal, R., & Roy, A. (2021). *The future of museum conservation: Digital archives and 3D documentation in Indian museums.* Archaeology and Society, 12(2), 55-68.
12. Mathur, S., & Srivastava, M. (2022). *3D laser scanning for cultural heritage: Opportunities and challenges in India*. Journal of Archaeological Technology, 10(2), 115-126.
13. Muthu, R., & Kumar, P. (2020). *Technologies for cultural heritage conservation in India: A comprehensive review.* Cultural Heritage Journal, 19(1), 67-83.
14. Noyes, D., & Johnson, A. (2022). *AI-based classification for heritage artifacts: Techniques and applications.* Journal of AI in Cultural Heritage, 9(2), 89-101.
15. Puspita, A. A. (2021). *A Study on Museum Artifact Digitization using Photogrammetry 3D Scanning Process*. Atlantis Press. Retrieved from https://www.atlantis-press.com/article/125967782.pdf
16. Raju, V. (2022). *Digitizing cultural heritage in South India: An evaluation of technological advancements and societal impact*. Journal of Indian Heritage, 29(1), 14-25.
17. Rao, K., & Patel, S. (2021). *LiDAR and hyperspectral imaging in the conservation of Indian archaeological sites: A review.* Journal of Archaeological Technologies, 8(3), 210-225.
18. Ray, M., & Singha, A. (2020). *The potential of virtual exhibitions in enhancing cultural heritage preservation in India*. Journal of Museum Studies, 16(4), 22-35.
19. ResearchGate. (2023). *The Bengaluru Inscriptions 3D Digital Conservation Project*. Retrieved from https://www.researchgate.net/publication/372628396

20. Sen, A., & Bhattacharya, A. (2021). *Digitization for cultural preservation: Strategies for museums in India*. International Journal of Heritage Conservation, 13(1), 89-100.
21. Singh, P. (2022). *Blockchain technology in museum and archival preservation: A security framework for cultural heritage*. Journal of Blockchain Applications, 7(3), 50-62.
22. Smith, R. L., & Thomas, B. (2020). *Digital archives and museum conservation: A global perspective*. International Journal of Digital Humanities, 8(2), 121-132.
23. Smithsonian Institution. (n.d.). *Smithsonian 3D digitization*. Retrieved from https://3d.si.edu/
24. UNESCO. (2023). *Digital Heritage Initiative*. Retrieved from https://en.unesco.org/digital-heritage
25. Verma, S., & Khan, F. (2022). *Virtual exhibitions: Enhancing access to museum collections in India*. Museum Studies Review, 19(2), 67-80.
26. Wang, Q., & Tan, W. (2021). *Digitization of museum objects in China and India: A comparative study of conservation techniques*. Journal of Cultural Heritage Preservation, 10(3), 132-143.
27. World Monuments Fund. (2020). *Global preservation strategies: Digital technologies and conservation of world heritage*. World Monuments Review, 22(1), 88-102.
28. Zhang, L., & Chen, Y. (2021). *Digitization in cultural heritage conservation: Opportunities and challenges*. Heritage Science, 9(4), 120-130.