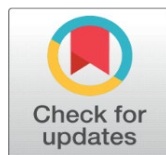
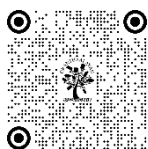


## SMART TECHNOLOGY USED IN MAKING SMART LIBRARY

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### ABSTRACT

The purpose of this paper is to highlight the various technology used in academic libraries and to improve understanding of its functionality and development, as well as to place it into the broader content of existing technologies that we can incorporate it into our universities, college libraries and services. It also discusses innovative technological developments. However, smart library and its role in academic research are no doubt going through a clear transformation in the 21st century.

**Keywords:** Smart Library, Innovative Technology

## 1. INTRODUCTION

Library is growing organism dealing with accommodating changes in technology, collections and services. Information is the key factor of any kind of research and development. Information is a fundamental resource which is essential for survival in today's competitive and wired world. It is a vital ingredient for socio-economic and cultural development of any nation or individual. The development of information technology application and its techniques are being used by the libraries for information processing, storage, communication, dissemination of information, automation etc. Further, origin of the intranet and development of World Wide Web revolutionized the information communication technology. Recognizing the advantages application of information technology the libraries are essential to provide the facilities to their user community. Technological change is becoming a driving force in our libraries. Information technology is a generic term used for a group of technologies. The adaption of any new technology requires the presence of an infrastructure with which it acquires, learn and successfully apply the technology. This includes sufficiently available human resources, well developed telecommunication networks, research and development capabilities and capital for investments. The library is the main information Centre which can make use of the fat development IT for the benefits of users. The librarian's preference of IT should include all those technologies which are expected to be used in the library operations and other smart library services. Library can be established without walls, without boundaries and its users can access the library collections from anywhere at any time with help of smart technologies and functioning the library as a smart library.

The term “smart” means flexible, adaptive, extendible, acknowledging and human.” Smart library is a hardware and software complex with a wide range of opportunities for searching and providing necessary information to virtual uses according to their inquiries and requirements. Another definition of smart library is a library provided services, which are interactive, innovative, informative, actual, changing and international.”[Aleksantrovich, Baryshev. Ruslan] 2016.

## 1.1. OBJECTIVES OF THE STUDY

- To explore the various innovative technology in academic libraries.
- To study the various services and operations in academic libraries.
- To study the different areas of library operations and services those are performed through the different technology used in academic libraries in India

## 2. METHODOLOGY

The smart library appears in various contexts as a synonym for the concept intellectual library such phrases as “digital library” and “virtual library” can also be found. The main purpose of a smart library is satisfying information request of a user, using modern information technology. It is possible to study information need of a user via instruments of information technology. This reflects the development of various technologies adopted in libraries in India. So, it is considered an ongoing leap towards the ubiquitous development technology. This study is based on the review of secondary literature, which includes journals; conference papers and relevant literature were also collected through Internet browsing.

## 3. REVIEW OF LITERATURE

There have been many studies on smart technology using in making smart library. The digital environment has brought numerous facilities for giving best services and quickly access to information with the help of smart technology has been used.

In a study Acharya<sup>1</sup> discussed innovative technology such as facial recognitions, updating media labs and maker space, robots, library portal application, virtual reality application, 3D printers. Montore<sup>9</sup> focused on education is the main mean of development and prosperity and for that accessing the current knowledge library play most important role for it. Provide recent resources, library should focus on such technology which is fulfill the user’s needs. Mohaptra<sup>8</sup> pointed out some recent technologies for initiative for modern and smart library. With the help of sensor technology we can save the time of users. RFID (Radio Frequency Identification) is useful for searching the library material in an easy way. Khuntia<sup>6</sup> Observed that day by day new technology implemented in libraries for functioning smartly. He explained the book delivery drone is being used in some library. Ali<sup>3</sup> studied on Near Filed Communication Technology to raise awareness and knowledge about NFC. Khan<sup>7</sup> studied necessity of smart library system. The study of various software for creating the database for maintains the user’s record. The utilization of various software and tools driven the libraries to move to paperless work. Phad<sup>10</sup> studied on the rapid development in information communication technology for retrieving the information according to user’s needs. Aleksandrovich<sup>2</sup> focused on use of technology in a library and is designed to be very collaborative learning environment. Pande<sup>11</sup> studied robotic system is useful for providing the information in a quickly way. Islam<sup>4</sup> stated that the growth and development of various technology for management of database for retrieving the information.

These reviews show that there is a various technology is used for updating the library services. However, there are still gaps to explore these recent technologies in all the academic libraries. It reviewed that the information professionals while adopting new information communication technologies faced some problems while implementing it.

## 4. DISSCUSSION AND ANALYSIS

Acharya, Shivakumar (2019) discussed the recent innovative technology in his paper that are the bleeding edge i.e. facial recognitions is coming of age, updating media labs and maker spaces ,robots, library portable applications, virtual reality application, 3d printers, kinetic bicycles in the library ,digital narrating, book conveyance ramble, digital interface for printed books, e-reader applications, cloud printing, replicating and examining. Many times users misuse

the library borrower cards. So it is necessary to find out the right user, facial recognition is updating technology. Facial acknowledgment can possibly supplant customary library cards. By utilizing the innovation, customary will know when user stroll into the library what their identity is, the place they live, what books they have looked at, and if any of their books are past due. He gave example of libraries who have as of now effectively executed some sort of computerized innovation. For instance, an increasingly cutting edge model is Connecticut's Westport library, which as of late gained two robots, Vincent and Nancy, that will be utilized to stand out enough to be noticed and raise their enthusing for innovation and in particular about the library. Library portable application is now useful for users for offers capacities like intelligent library directs a library virtual visit, a library index, an intuitive schedule with all virtual visit, a library index, an intuitive schedule with all the library's occasions, the like hood to credit and peruse electronic books and articles encouraging their exercises. (Acharya & Hiremath, 2019)

**Montore, carme. Galve. (2019)** He focused on "education is the main mean of development and prosperity". Library plays an active role in promoting learning and training of diverse skills. He emphasized on to ease access and creation of information i.e. databases, digitization equipment, digital libraries, and readers, personal computers, laptops, tablets, mobile phones, educational robotics equipment, 3D printers, etc. and to implementation these technology required buildings efficiently and sustainably manage buildings means building information management software and to improve to logistic operation i.e. RFID and robotics in the distribution of bibliographic materials. Social media, automation of Omni channel marketing requires to get in contact with users. Attractive and innovative facilities to their users through videogames, immersive technologies (VR or AR), etc. (Montore, 2019)

**Mohapatra, Niranjan and Jadhav, Chetan (2017)** Pointed out some recent technologies for initiative for modern and smart library. A smart library will utilize the sensors to evaluate by using fully smart technologies to serve its users and all the activities of the library should be in smart way. He further added the RFID technology. Using radio frequency identification technology, circulation transactions issue/return will be simplified, automated and even without help of a library staff. Searching of library material will be easy and time saving and all the materials will be safe from stolen. Another technology is the cloud technology is a type of on-demand IT service in which users can receive IT resources over the internet anytime and anywhere. It is based on virtualization and distributed processing technology; it provides software, platform, and infrastructure. (Mohapatra & Das, 2017)

**Khuntia, S.K. (2016)** stated about technology used for smart library that most of libraries lead in the smart way towards digital citizenship. It should be the first places where most advanced technologies are to be implemented. He stated about the library bookmark and guide, augmented reality app, book delivery drone, digital interface for print books, mobile library center, and library location technology. He explained further the smart libraries world-wide have a huge potential to facilitate open and free sharing and human interaction in innovated design open source software's. So, the best way to develop effective new technology is by undertaking multiyear large-scale research projects that develop real-world electronic test beds used by actual users and by aiming at developing new comprehensive and user-friendly technologies for digital libraries. (Khuntia & Misra, 2016)

**Ali, Doaa (2015)** highlighted on the Near Field Communication (NFC) technology trying to raise awareness and knowledge about NFC within information science society and to improve understanding of its functionality and development as well as to place it into the border context of existing technologies that can incorporate it into universities libraries and services. (Ali, 2015)

**Khan, Ziya (2013)** explained the requirements of smart library system. He explained four components are requiring for smart library system that are user account, secure server connection, Buffers, database. Create a user account in library management system. After registration he or she can able the searching books, reserving of books and checking the status and the history of user. Maintain the secure gadget for securing data. A buffer is the kind of software which can maintain reservation of record in stipulated time. Database is essential for string data of every individual user and books which is useful for functioning the system. (Khan & Rehman, 2013)

**Phad, Devidas. V. (2019)** focused on rapid developments in computers, telecommunication and other technologies have made it possible to store and retrieve information in many different forms and from any place with a computer and telephone connection. E-books, E-journals, E-databases, E-newspapers consortia through this we can provide the best services to our users. The adoption of e-resources proves true to the age old principle that "Every reader should get information at any time" Librarians need to balance various elements, demands, constants adjustment in provision of cost effective services. E-resources is the were future, it will be an outing challenges to libraries for years to come. .E-

resources is useful for libraries as well as each and every users of the society who are hungry to get various information through the world. (Phad, 2019)

**Das, Basanta. Kumar (2019)** emphasis on the more e-resources from outside there library through the Library Networks and e-resource consortia. The libraries are connected with many library networks like DELNET, ERNET, NICNET etc., and share their resources through e-books, e-journals, online databases, e-thesis etc., among membership of libraries. In present age is full on using the mob-apps TV shows, social networks, e-business, e-wallet, I-banking can get access to his needs easily with utilizing a lower speed of internet connection. After development of applications for library, it provides its users smart services to access from their mobile, tablet, PCs.(Mohapatra & Das, 2017)

**Aleksandrovich, B.R. (2016)** discussed the development of computer technology, digital storage telecommunications, internet and human-computer Interactions. He observed the new services and programs aimed at providing better information services to users. He included the services in student personal account like bibliographic search, preservation of inquiries on a subject, order of edition, list of references, literature on hands, delivery history, demand for extension of book, etc. This type of service development may require rethinking library's overall mission with a focus on new information technology. Smart library focuses on use of technology in a library and is designed to be very collaborative learning environment. Web-based technology provides users and information professionals with powerful and flexible tools for information dissemination. (Aleksandrovich, 2016)

**Pande, V. (2019)** stated the various section of the smart library library assistant robotic system is GSM module. In this module used to check the availability of a book that conveys the message to a user. GSM stands for chip or circuit that will be used to establish communication between a mobile device and a computing machine. It needs a SIM card a bit like mobile phones to activate communication with the network. Another system is robotic arm, in this system is used for pick and place the book in a rack and it forward towards the computer. The next one is microcontroller, which is used in Arduino UNO board. Because of electronic and mechanical automation, it reduces the time required for library management tasks. (pande, Yenurkar, Landge, & Yadav, 2019)

**Islam, Shariful (2006)** discussed the different areas of libraries have been used and most cases are still being used to automate the functions. ICT is used in various fields of library activities in Indian libraries. In acquisition policy, it used in acquisition list and order file report. Serials management, check-in/out and claiming and union holding list. Cataloguing and classification and circulation. Also used in audio-visual management and information storage and retrieval and references and information section. (Islam & Nazmul, 2006)

Activities focused on smart technology are as given below.

Activity Focused	Smart Technology Performa
Acharya :- Library Borrower Card	<ul style="list-style-type: none"> <li>• Facial Recognition Technology</li> <li>• Virtual Visit</li> <li>• Kinetic bicycles</li> <li>• Electronic books</li> </ul>
Montore:- Library Building and spaces	<ul style="list-style-type: none"> <li>• Robotics</li> <li>• Omni channel</li> <li>• VR</li> <li>• AR</li> </ul>
Mohapatra:- Circulation	<ul style="list-style-type: none"> <li>• Sensors</li> <li>• RFID</li> <li>• Cloud Technology based on virtualization and distributed processing technology</li> </ul>
Kuntia :- Digital Interface	<ul style="list-style-type: none"> <li>• Library bookmark and guide</li> <li>• Book delivery drone</li> <li>• Library Location Technology</li> <li>• Open Source Software's</li> </ul>
Ali :- Near Filed Communication	<ul style="list-style-type: none"> <li>•</li> </ul>
Khan :- Library management System	<ul style="list-style-type: none"> <li>• Security Gadget</li> <li>• Reservation of record</li> </ul>
Phad :- Telecommunication Technology	<ul style="list-style-type: none"> <li>• E-books</li> </ul>

	<ul style="list-style-type: none"> <li>• E-journals</li> <li>• E-databases</li> </ul>
Das :-Library Networks and e-resource consortia	<ul style="list-style-type: none"> <li>• DELNET</li> <li>• ERNET</li> <li>• NICNET</li> </ul>
Aleksandrovich :- Digital storage Telecommunications	<ul style="list-style-type: none"> <li>• Web based technology</li> <li>• Information dissemination services</li> </ul>
Islam :-Library Function with ICT based services	<ul style="list-style-type: none"> <li>• Digital mass store</li> <li>• Teletext CATV</li> <li>• Satellites, videodisc</li> </ul>

**Analysis:** Information is an indispensable for human development as air is essential for the survival of all living organisms on earth, including human beings. The pace of change brought about by new information technologies has a key effect on the way people live. Works play worldwide. The increasing role played by information technology in the development of library services for an active reaction to the challenges of the information service providing and fast development of information technology and its application in the library services. Today libraries are equipped to accomplish the newly information technology based services. The development of information technology enabled services fulfills the information needs of the users at the right place to tight person.

**Conclusion:** Smart library is designed to serve all library services faster, better and smartly to its end users through digital technology in different software applications. Smart libraries, as environments for social learning and collaboration, present facilitators of education and knowledge with accelerating dissemination of information in a digital age. Smart libraries emphasize their activities on providing an information commons to the users. The vision of Smart library is to create an “indoor living lab”, where students and researchers can develop, test and test and presents smart technologies, access and analyze the collected data to carry out both qualitative and quantitative studies also by applying different types of open source software as and when required accordingly. Day by day new development occurs in technological era and which is helpful for making the smart library.

## CONFLICT OF INTERESTS

None.

## ACKNOWLEDGMENTS

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