COBOT AND LIBRARIES

Dr. Prakash Bhairu Bilawar
Deputy Librarian, Barr. Balasaheb Khardekar Knowledge Resource Center,
Shivaji University, Kolhapur.
Corresponding Author - Dr. Prakash Bhairu Bilawar
Email- pbb_lib@unishivaji.ac.in
DOI - **10.5281/zenodo.7136764**

Abstract:

The current pandemic situation and 'Industry 4.0' provide an opportunity to focus more on consultancy services, which stands fifth in the range of data, information, knowledge and wisdom. The present paper underlines on cobots and its use in libraries/information centers to acquaint the users with the smart services and conceptual working framework after focusing on various emerging technologies and its use in libraries.

Keywords: *Robot, Cobot, Library, Information, Service Etc.*

Introduction:

In this present Novel Corona virus pandemic crisis along with the care of social distancing, sanitization, use of masks, ppf kits etc., unlock in library services with support of technology is of prime concern for the academicians as education doesn't stop considering its sentimental effectiveness to the global world for all the sectors. Again, for how much time these precocious measures should be practiced considering continuity in academic and learning work and how do we counter that? Under these circumstances, the use of cobots (Collaborative Robots) and it's allied intelligent/smart devices an output of industry 4.0,may work like a human interaction to fulfill the academic needs of the users. Quick deployment, automation flexibility, cost effective, scalability, advanced safety features; easy programming and human friendliness are the strong merits of such industrial 'assista' devices facilitating human employees to work more on value-based chore by saving time and money. Adaptability of cognitive tasks, greater degree of speed, time and accuracy, mobility, versatility etc. features results in accomplishment of the given task automatically based on the sensor controlled and inbuilt remote program processing system helps in reducing the manpower requirements.

Review of Literature:

For this work, several information sources (both print and digital) have been consulted to know the uniqueness of the present work and the work already done in this area highlighted below-
Perera & Others (2015) presented a new approach called-'KnoWDiaL' a combination of knowledge, web and dialog useful for learning and using task-relevant knowledge from human-robot dialog and access to the web. It handles the interpretation of voice commands, robust regarding speech recognition errors and is

able to learn commands involving referring expressions in an open domain. In order to solve the futuristic challenges in the cooperative manufacturing, Sadik & Urban (2017) proposed a distributed control solution which combines an ontology-based Multi-Agent System (MAS) and a Business Rule Management System (BRMS) to know an atural language which is human readable and in the same time can be understood by the machine(cobot). Apoorva & Others (2019) in their study described the procedure for mechanical use of robots in the library especially for book finding and picking applications. Malik and Bilberg (2019) present a methodology for tasks distribution between human and robot in assembly work by complexity-based tasks classification. Further, the method will differentiate the tasks with higher complexity of handling, mounting, human safety and part feeding from low complexity tasks, thereby simplifying collaborative automation in human-robot collaboration (HRC) scenario. Odeyemi (2019) investigated the infrastructural readiness of Nigerian academic libraries in deploying robots and its potential for the provision of library services.

Chakraborty & Gangopadhyay (2020) in their article discussed the pros and cons of on-site v/s online learning by exploring foreign educational opportunities in the pandemic time. Chen & Others (2020) in their study proposes a fuzzy collaborative intelligence approach to assess the robustness of a factory to the COVID-19 pandemic by applying a proposed methodology to assess the robustness of a wafer fabrication factory in Taiwan to the COVID-19 pandemic. Rodriguez & Others (2020) in their study specified the mechanism of the 'Tour robot' as a personal guide for the visitors in multi-

floor buildings with the base of Gida Bot applications. Tella (2020) highlighted the use of robots in libraries that includes shelving and locating of library materials, security, inquiries and answering of repetitive reference and directional queries that assist in information illiteracy instructions and in automated storage and retrieval systems etc. Thus, it can support for imitative task in libraries with adaptive behavior. Nguyen (2020) described the impact of humanoid robots (social robots)in Australian public libraries and the result reveled that these robots are considered as a community builder, a teacher, an aide, and a challenger in providing library services to their members.

Emerging Technologies and Its Use in Libraries:

The emerging technologies are fast-forwarding that makes impact on the prompt and timely work and library services for their potential customers. In this current 'trendy' approach, libraries need to proven their capabilities, identify the areas and integrate the library services under this mode considering the need of 22nd century to unleash creativity.

Following are the emerging technologies now rapidly used in the libraries and information centers to put forward for the wellbeing of the clientele:

a. **Mobile/apps:** Is a ready to use program with all customized menus used widely in all the sectors to smarter our daily fulfillments positively. The additional platforms include use of WhatsApp, QR code, Internet/email applications, Telegram, Notification apps etc. makes life blood of common human life with this hand held

devices. Thus, improves in the access to library resources and services. It proved to be a best tool jointly used for knowledge and entertainment purpose.

b. **Artificial Intelligence (AI):** Power of AI in decision making/customer engagement is strong enough to suit the decisive situation with the backbone of expert systems and machine learning. Now in all the areas/fields the use of AI proves to be a vital platform to serve and sustain smartly. Online discovery systems, multi-format searching, storage/process/reconfiguration of data sets, use of expert systems in cataloguing/classification/indexing/acquisition etc. are the applications rest with this technology.

c. **Augmented Reality (AR):** Assist smart technique for digital objects into enhanced view of real world. Learning through observing and experiencing of digital content helps user to understand the topic fully thus improves in reading skill, bi-directional flow of communication by filtering the information etc. are the library output services.

d. **Big Data:** Is refined and synthesized data sets, holds up the academic research as consist of scholarly data/information suitable to all the stakeholders with their domain specific interests.

e. **Internet of Things (IoT):** Is the amplification of internet connectivity into physical devices at par with the experiences of everyday entity. The application rest with the libraries under IoT includes use in circulation module, user identification and security, inventory control, alerting service and tracking of library information resources etc.

f. **Drones:** Are the remote controlled flying portable devices showcases the things minutely within the geographical distances. Library delivery services are best performed by this system by creating and storing the data on it for the readers who unable to make physical visits to the library. Very recently in India, new drone policy will be functioning to stop the misuse of drones.

g. **Block Chain:** A kind of database of digital records that collect and store the data with high security measures. Creation of enhanced metadata, community driven lending and peer to peer sharing of e-information etc. are the information services rest with this technology.

Thus, the use of these emerging technologies reflects in the nomenclature and functioning of library into a dynamic recreational community hub with open spaces (maker spaces), e-services/collections/facilities and access to all in all-time useful for collaborative learning platforms with corporate look. Hence, critical thinking, communication skill, collaborators, leadership value and data analytics etc. are the capabilities of corporate world will match in library world with the use of Robots/Cobots.

COBOTS:

Are the heterogeneous Light-Weight Robot (LWR) machine used for personal assistance at par with Robots capable of operating safely with the human co-worker in a shared work environment. "Robots are moving from industrial and

factory settings into everyday work, educational, research, and living spaces. These collaborative robots (or CoBots) will be able to perform repetitive tasks and work alongside humans" (Figueroa and others 2015).Chatbot systems stimulate an intelligent conversation helps in chat services. Robots, AI are the supporting technologies with the Cobots with the synonyms like Universal Robots (UR) based on industrial robotics approach built on the concept of HRC. Basically they are the perfect solution for automation task of micro, small and medium sized enterprises. David (2020) in his interview stated the latest configuration of cobots that is "Universal Robot's latest e-series range has cobots which are complete with a built-in force torque sensor, 17 adjustable safety functions (including stopping time and stopping distance) and Cat.3 PLd certified safety. These are the UR3e, UR5e, UR10e and UR16e, each named after their payload of 3 kg, 5 kg and 16kg respectively. They also have varying arm lengths, or reaches, to suit different applications such as machine tending, palletizing, packaging, quality inspection and pick & place."

Collaborative or Cooperative robotics are the synonyms words, a new branch of industrial robotics that authorize the idea of cooperative manufacturing. The slim difference is that in the cooperative robotics, both the workers and the robot are performing tasks on the same product in the same-shared workspace but not simultaneously whereas in collaborative robotics it perform simultaneous task.

Cobot and Library:

Dr. Prakash Bhairu Bilawar

Using technology and automation to upsell and cross-sell, compelling with original ideas inspire researchers to break new ground by using robotic arms. Graham (2019) identified four types of robots currently used in libraries. These are shelf-reading robots, telepresence robots, humanoid robots and Chatbots. Conglomeration of emerging trends/technologies assists the human being to serve smarter in all the fields by crossing the boundaries over limitation of education, age, location and culture. It is essential to know the type of robots meticulously used in libraries for more than one purpose.

Conceptual Roboflow:

The applications of cobots in the libraries are shown below through the conceptual working framework considering all library applications/services at a single integrated juncture.
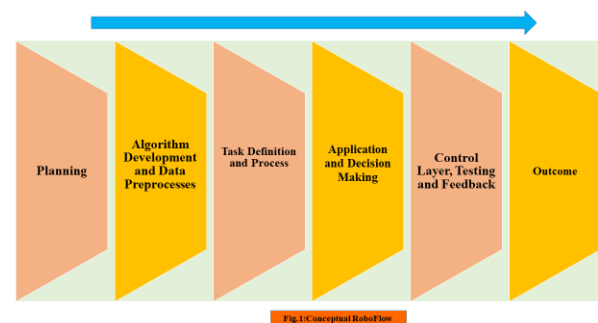

Fig.1:Conceptual RoboFlow

Library Applications:
The cobot library applications are overviewed below-

a) Stack Section
- Assists in merging of books without disturbing the arrangement of books
- Picking and passing books at the circulation counter
- Applies in big stack areas to transfer heavy bundles of books

from one end to another at a time.
- Account on missing and out of sequence books.

b) Reading Hall
- OPAC area to find out the details of desired book by RFID tags and location
- Assistant/react on comments during reading the books/e-books
- Involved in face identification/verification module, navigation system, protocol etc.

c) Physical conduct of examination in Library/Internet halls
- Smart conduct of online examination/webinar/training/presentations etc.
- Increase customer acquisition and wallet share across the consumer journey
- Support to moving towards corporate gaze

d) Other services
- Automated storage and retrieval system to access desired materials
- Chat Service/conversation on directional inquiries
- Develop a new kind of social relationship
- Entrance/Login services after recognizing human voice
- Substitute for 'Reference Librarian'
- Useful in pandemic situation against shortage in labor/staff
- User centered service to support 'smart patron'

Limitations:
While taking the services of cobots in the libraries certain limitations needs to be explored such as -
- Applicable in small/special libraries,
- Limited budget and space,
- Discipline/ subject based membership,
- Open access facility
- RFID system etc.
- Norms/Guidelines of various federation/ association regarding robotics/engineering
- Compatibility with human-robot relationship
- Paucity in technical skill/knowledge of librarian and poor ICT infrastructure

Conclusion:
Pandemic situation teaches us to sturdily shift over to online mode of education. The collective impact is so bad that some of the institutions pursue degrees fully in online education only with restrictions on physical lab/field/onsite work assignments and the students are make up their minds for this change and achieve academic success credits. Considering the uniqueness and use of emerging technologies specified above in the higher education sector, now the achievable motto will be- *'be flexible, be innovative'* with all entrepreneurial capabilities and scope towards *meta university*, a joint program initiatives leading to formation towards pro-active information culture.

References:
1. Apoorva & Others (2019). Library Assistant Robot. *International*

Journal of Engineering Research & Technology, 8 (6), 358-360.

2. Chakraborty, M., & Gangopadhyay, A. (2020). Higher education: The way forward with Covid-19. *University News,* 58 (44), 16-19.

3. Chen, T., & Others (2020). Assessing the robustness of a factory amid the covid-19 pandemic: a fuzzy collaborative intelligence approach. *Healthcare*, 8 (481), 3-26.

4. David, P. (2020). Cobots help in utilizing employees' talents to their maximum potential. *Industrial Products Finder*, 49 (2), 136-138.

5. Figueroa, M., & Others (2015). Forecasting the future of libraries. *American Libraries,* 46 (3/4), 28-45.

6. Graham, M. (2019). Robots in the libraries, available at: www.Soutron.com/robots-libraries/ Accessed on 12/11/21.

7. Malik A. & Bilberg, A.(2019). Complexity-based task allocation in human-robot collaborative assembly. *Industrial Robot: the international journal of robotics research and application,* 46(4), 471–480.

8. Nguyen, L. (2020). The impact of humanoid robots on Australian public libraries. *Journal of the Australian library and information association*, 69 (2), 130-148.

9. Odeyemi, S. (2019). Robots in Nigerian academic libraries: Investigating infrastructural readiness and potential for library services. Information Technology Satellite Meeting on "Robots in libraries: challenge or opportunity?", 21-22 August 2019, IFLA, WLIC, Germany: Technical University of Applied Sciences.1-7.

10. Perera, V., & Others (2015). Learning task knowledge from dialog and web access. *Robotics*. 4, 223-252.

11. Rodriguez, I., & Others (2020). Personal guides: Heterogeneous robots sharing personal tours in multi-floor environments. *Sensors*, 20 (2480), 1-23.

12. Sadik, A. & Urban, B. (2017). An Ontology-Based approach to enable knowledge representation and reasoning in worker–Cobot agile manufacturing. *Future Internet*. 9 (90), 1-23.

13. Tella, A. (2020). Robots are coming to the libraries: Are librarians ready to accommodate them?,*Library hi tech news*, 8, 13-17.

Dr. Prakash Bhairu Bilawar