

**How to Cite:**

Phukan, D., & Saikia, D. (2022). Implementation of RFID technology in Indian Institute of Technology, Guwahati: A survey. *International Journal of Health Sciences*, 6(S2), 6073–6078. <https://doi.org/10.53730/ijhs.v6nS2.6638>

# Implementation of RFID technology in Indian Institute of Technology, Guwahati: A survey

**Debashi Phukan**

M.Lib.I.SC, Dibrugarh University, Assam, India

Corresponding author email: [debashreephukan36@gmail.com](mailto:debashreephukan36@gmail.com)

**Dimpi Saikia**

Library Trainee, IIT Guwahati

Email: [dimpisaikia039@gmail.com](mailto:dimpisaikia039@gmail.com)

**Abstract**---Radio Frequency Identification (RFID) refers to a wireless system comprised of two components: tags and readers. The reader is a device that has one or more antennas that produce radio waves and receive signals back from the RFID tag. An RFID system for library normally consists of RFID tags, a self check-out station, a self-return system/ book drop system, a staff work station, a tagging/programming station, security gates, a shelf scanner for inventory/digital library assistant, conveyor belts and sorting systems, etc. The use of RFID reduces the amount of time required to perform circulation operations. This technology helps librarians eradicate valuable staff time spent scanning barcodes while checking out and checking in borrowed items. IIT Guwahati Library offers a distinct service that is very useful for users, such as the ability to return books when the Library is closed. This paper discusses about the application and uses of RFID technology in the Central library of IIT Guwahati.

**Keywords**---RFID technology, implementation RFID, radio frequency identification.

**Introduction**

Radio Frequency Identification (RFID) refers to a wireless system comprised of two components: tags and readers. The reader is a device that has one or more antennas that produce radio waves and receive signals back from the RFID tag. Tags, which use radio waves to communicate their identity and other information to nearby readers, can be passive or active. Passive RFID tags are powered by reader and don't have a battery. Active RFID tags are powered by batteries. RFID which is a combination of radio-frequency-based technology and microchip

technology is one of the most important application in every field including highway toll payments, automotive, packaging and handling, and retail industries, libraries, etc.

According to Automatic Identification and Data Capture (AIDC), "Radio Frequency identification is a technology that uses radio waves to transfer data between a reader and an electronic tag which is attached to a particular object. Typical uses are for object identification and tracking". According to Harrod's Librarians' Glossary and Reference Book, 2 "Radio Frequency Identification, an alternative to the Bar Code that uses tiny microchips in tags to hold and transmit detailed data about the item tagged. RFID has advantages over bar codes such as the ability to hold more data, the ability to change the stored data as processing occurs, it does not require line-of-sight to transfer data and is very effective in harsh environments where bar code labels may not work". Thus, RFID is technologies that use radio waves to automatically identify or track people or objects.

### **Library RFID Components**

An RFID system for library normally consists of RFID tags, a self check-out station, a self-return system/ book drop system, a staff work station, a tagging/programming station, security gate/s, a shelf scanner for inventory/digital library assistant, conveyor belts and sorting systems, etc.

- RFID Tag  
The tag is paper thin, flexible and approximately 2"x 2" in size which allows it to be placed unremarkably on the inside cover of each book in a library's collection. It consists of an attached antenna and a tiny chip which stores vital bibliographic data including a unique ID number to identify each item.
- Self check-out station  
The Self Check-out station is a computer with a touch screen and a built-in RFID reader, software for personal identification, document handling and circulation. With the use of Self Check-out system, the patrons can check out the documents themselves by following the touch screen menu without taking any assistance from library staff.
- Book-Drop (Return Station)  
The book drop system consists of book drop with screen and receipt printer. It allow patrons to automatically return the library documents. A reader installed in a book drop allows reading of the RFID tags as patron drops off the documents. It eliminates the labour-intensive steps of check-in and deactivation of the security protection by the library staff. It automatically checks- in the document, takes them off the patron's library account and reactivates the security function.
- Security gates  
Security gate/ EAS (Electronic Article Surveillance) is an anti-theft system used by libraries. It plays a crucial role in detecting improperly checked-out library document. Theft detection is an integral feature of the chip within the RFID tag which performs both the item identification and anti theft function.
- Automated sorting station

Automated sorting station take books from the return station, checks them in, sorts and distributes the books to multiple bins or areas for re-shelving. Books are re-shelved by determining their shelving location in less time with less staff work. Libraries with large circulation eliminates the check-in and sorting of returned library documents by combining a sorter with one or more book drop readers.

➤ **Staff work Station**

Staff work station is a staff assisted station which is used in a library for charging and discharging documents, programming of new documents, sorting of documents, etc. It consists of a reader and a PC. For doing programming/tagging of a new library document with the help of staff work station, it is first put on the reader, the accession number of the document is read with the help of barcode scanner and then the data is downloaded from the library management system.

➤ **Inventory Control**

Inventory and shelf reading can be carried out with a portable reader. The reader transmits identification number to the server, which in turn sends it to library management software and response is returned in real time. Alternatively, information may be downloaded with library management software for inventory control. Shelf Management system makes it easier for the library staff to locate and identify the documents on the shelves.

### **Objectives of the study**

The objectives of the study are given below

- To find out the application of RFID technology in the surveyed library.
- To know the current status of the RFID implications in the surveyed library.
- To know the uses RFID technology in the library.

### **Scope and limitations of the study**

The scope of the study deals with the possible areas of the study in the topic. The scope of the study area is limited to the library of Indian Institute of Technology , Guwahati. it is selected on a purposive basis.

### **Research Methodology**

Keeping in view the objectives of the study, an effort is made to evolve a suitable methodology of the research. The study has been designed , developed and carried out to analysis the implications of RFID technology in Central library, IIT Guwahati. Survey method and observation technique has been used for to collect data.

### **Data Analysis & findings**

#### **About Indian Institute of Technology Guwahati**

Indian Institute of Technology Guwahati, the sixth member of the IIT fraternity, was established in 1994. The academic programme of IIT Guwahati commenced

in 1995. At present the Institute has eleven departments and five interdisciplinary academic centres covering all the major engineering, science and humanities disciplines, offering BTech, BDes, MA, MDes, MTech, MSc and PhD programmes.

### **About Central Library of Indian Institute of Technology Guwahati**

Central Library of Indian Institute of Technology Guwahati is known as Lakshminath Bezbaroa Central Library. It provides library and information services to support teaching, learning, research activities by creating state-of-the-art facilities and offering innovative services. The library has latest collection of information in sciences, engineering, technology, humanities & social sciences with a fast growing collection of books, journals, magazines both in print and digital format. The Library of the Institute was named after the renowned and much revered literary figure Sahityarathi Lakshminath Bezbaroa on 5th December, 2014.

### **Number of Users**

The success of any library is depending upon its user and its services to diversify users' needs. Any person who seeks information or uses the library can be a member of the library such as students, research scholars, faculty, staff etc.

Table 5.1 : Number of users

Status of the user	Number of users
Student	7290
Library Staff	18
Faculty	439
Others	513
Total	8260

The above table 5.1 shows the total library users of IIT Guwahati library are given along with its different member categories.

### **Application of RFID Technology in the Library**

RFID is the latest fast growing technology to be used in library for minimizing the theft of documents and as an access control systems. RFID-based systems move beyond security to become tracking systems that combine security with more efficient tracking of materials throughout the library, including easier and faster charge and discharge, inventorying, and materials handling.

Table.5.2: Application in RFID in the library

Issue- Return	✓
Security	✗
Stock Verification	✓
Others	✓

Above table 5.2 shows that application of RFID technology in integrated library management system of the library. For Issue-return and stock verification RFID has used in the library and also uses in other Integrated library management works. In security system RFID has not implemented yet.

### **Implications of RFID Technology in IIT Guwahati Library**

#### **Use of Drop Box**

The Drop Box is used for returning the books. There are two Drop Box are available in IITG Library. One is located inside the Library and another one is outside of the Library. This offers unprecedented flexibility and convenience of returning books at any time of the library, even when the library is closed.

#### **Method of returning Books**

IITG Library offers a distinct service that is very useful for users, such as the ability to return books when the Library is closed. An external book return is a machine with a slot with a chip RFID reader integrated into the wall. It works the same way as the self-checkout station. The user identifies himself /herself, and then puts the book(s) in to the slot. After completing the return, the user will receive a receipt showing how many and which books were returned. If they have already been checked in, they can go back onto the shelves.

#### **Usefulness of RFID in Circulation System**

Circulation system is being upgraded with RFID based technology for faster transactions. One RFID based Book Drop Kiosk and two Self- Check-Out Kiosk have been installed in the first floor of library for self issue/re-issue/return of library books beyond regular working hours. Another RFID based 24x7 Book Drop kiosk has been installed in the basement of the Library building for uninterrupted supports to the library users. Smart card has use only for issuing purpose.

#### **Benefits of RFID Technology in Library**

- Ability to locate Specific Items.
- Self- check-in & check-out can be done using RFID by the user.
- Easy to find the misplaced books.
- Library theft control.
- Time-consuming for staff and the user.
- Easy stock verification.
- Faster circulation (RFID Application reduces the amount of time required to perform circulation operations).
- Faster inventory process.
- More than one item can be checkout and check-in at the same time.

## Disadvantages

The main disadvantages of RFID system are as follows

- High cost: The major disadvantage of RFID technology is its cost.
- Vulnerability to compromise: It is possible to compromise an RFID system by wrapping the household foil to block the radio signal.
- Removal of exposed tags: The RFID Tags cannot be concealed in either spine or gutter of the books and are exposed for removal.

## Conclusion

The use of RFID reduces the amount of time required to perform circulation operations. This technology helps librarians eradicate valuable staff time, spent scanning barcodes while checking out and checking in borrowed items. For the users, RFID speeds up the borrowing and return procedures. Library employees are released for more productive and interesting duties. Staff are relieved further when readers are installed in book drops. RFID systems have an interface between the exit sensors and the circulation software to identify the items moving out of the library. According to S.R.Ranganathan fourth law of library science is that 'Save the time of the reader'. By implementing RFID technology in the library it save the readers valuable time. In IIT Guwahati library also face pros and cons for using RFID technology. Benefit is that save users time and also the staff workload. Disadvantage is that need power and energy, sometime it occurs technical error. Despite all this IIT Guwahati library manage all these things very smoothly and it's highly satisfied by the users. It is no doubt that IIT Guwahati library is one of the great academic library of Assam.

## Reference

- Gautam, Ankur(2021) Implementation of RFID Application in Indian Institute of Technology, Kanpur. International Journal of Library and Information Studies, Vol.11(1)
- Singh, Neeraj Kumar & Mahajan, Preeti (2014). Application of RFID Technology in Libraries. International Journal of Library and Information Studies, 4(2).
- Sinha, Manoj Kumar & Chanda, Anupam (2014). Exploring RFID Technology Application for Managing Library and Information Services in University and Institutional Libraries of North East India: An Overview. International Journal of Information Sources and Services, 1(3), 72-85.
- <https://www.iitg.ac.in/> (Retrieved on 20/04/2022)
- <https://www.iitg.ac.in/lib/> (Retrieved on 20/04/2022)