
Library Management

An RFID based technology

OpenWorks **LIBRARY**

Technical Specification V1.0.2

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RFID Technology

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Radio Frequency Identification (RFID) is an Identification technology used for contact less way of automatic data collection where an RFID Reader reads information in a tag.

Texas Instruments Radio Frequency Identification (TI-RFID™) Systems is an industry leader in radio frequency identification (RFID) technology and the world's largest integrated manufacturer of RFID tags, smart labels and reader systems.

With more than 400 million tags manufactured, TI-RFID technology is used in a broad range of applications worldwide including access control, automotive, document tracking, livestock, product authentication, retail, sports timing, supply chain, ticketing and wireless payment.

The commercial use of RFID appeared in the form of Electronic Article surveillance (EAS) in the mid 1960's, and then the application was extended to the areas of Access control, Animal tracking, Vehicle tracking and factory automation applications.

With the growing applications of RFID into the Supply Chain Automation, Material Handling System, Warehouse Management System, etc. the need for the demand from the manufacturers to develop systems that support various decision support systems enable large corporate companies to foray into the RFID arena.

Thus RFID technology can be taken as the next evolutionary step in the Automatic Identification technology. It integrates the digital world with the physical world by seamlessly connecting the objects of the physical world.



RFID System Components

RFID systems have several basic components or technical characteristics that define them. Some of the components that constitutes a RFID system includes

1. Transponder or Tag
2. Reader or Interrogator
3. Antenna
4. Software

Transponder

The transponder consists of a microchip attached to an antenna and is placed in the object or entity to be located. These tags generally are of passive form, which don't have any power source or batteries into it. Based on the memory design the tag can be of various type like RO (Read Only), RW (Read/Writable), etc.

Reader

The reader is a device that does the communication from and to the transponders through radio waves. Some readers have the antenna integrated into it and others have provisions to connect external antennas for increased read range.

Antenna

The Antenna forms a part of the RFID reader and it takes a variety of shapes. The antenna is used to transmit and receive the radio waves in the form of RF signal between the reader and the tag along with the data.

Software

The software acts as a middleware between the RFID systems and the Enterprise applications. The data captured by the reader is converted into a format that is perceivable by the system. OpenWorks series of software acts as a middleware between hosts of applications.



RFID in Library Management

RFID can be used for Library management application as a way to improve the management of important document files in industries like insurance and legal where the loss of such files can cause severe problems. RFID improves the tracking of books and documents so that the books can be more quickly located and the document workflow more easily tracked.

The Process

Each file is tagged with a smart label that contains a unique ID and human readable information. The file description is entered into a database along with its tracking number. The file can be assigned certain parameters like expiration date, permitted movement, and persons authorized to see it. Over time the database can build up an audit trail of the handling and workflow history of each document file. Employees can locate a file by entering a request in their desktop PC.

Components

1. RFID Reader
2. RFID Smart Labels / tags
3. Database
4. OpenWorks Library Software



RFID Library Management KIOSK



Reader

The RFID reader for library management forms the basis for the data capture process. Depending upon the requirement, the reader can be mounted to a permanent fixture like a wall or to a nearer place where easy access is possible. When permanent mounting is not possible then mobile type of readers can be used to scan and read data from the tags.



Handheld RFID reader

RFID Smart Labels / Tags

The document to be tracked is attached with the RFID tags. The information pertinent to the document can be embedded on to the tag and information like document Id, author info, publisher info, etc. can be stored inside the transponder memory which can accommodate a maximum of 2000 bits of information.



Smart Labels are attached to files

Database

The function of the database is to provide an organized repository or collection of data. The document information like document Id, author info, publisher info, etc. can be also recorded inside the transponder memory that can accommodate a maximum of 2000 bits of information.



Wall plate RFID readers



OpenWorks Library Software

Openwork Library is comprehensive software behind the system that integrates all the sub-systems viz. Database, RFID readers, transponders and the other components. It manages all the transactions of the system and reports the transactions in a web-based form.



RFID reader can be integrated to a PDA for mobile Library tracking



OpenWorks *LIBRARY* application

The database of the customers as well as the book ID can be stored in a centralized server and the OpenWorks Library application forms a bridge through the ODBC connectivity and updates the table depend on the nature of the transaction like book issue or submit. Thus the patrons can self-check themselves in managing the books, CD media and other library resources.



Potential Benefits

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Patrons will be enjoying self-checkout, shorter checkout lines and improved customer service, while the library staff can spend more constructive time assisting patrons and less time with repetitive, clerical tasks. The following are some of the advantages RFID excels over other auto id technologies like barcode.

Advantages & Benefits:

- ✓ Efficient Book circulation management
- ✓ Automate library processes
- ✓ Automatic Check-in and Check-out
- ✓ EM Door Lock integration (Electro Magnetic Lock)
- ✓ Integration with existing library management system
- ✓ Library inventory tracking in minutes instead of hours
- ✓ Non- Line-of-Sight Technology
- ✓ Multiple books can be read simultaneously
- ✓ Read/ Write capability
- ✓ Data can be updated on the fly
- ✓ Unique ID of the RFID transponder prevents counterfeiting
- ✓ ISO/IEC 15693 compatible RFID sticker labels
- ✓ Unique tamper proof Book ID code
- ✓ Easy tracking of issued/stolen books and documents
- ✓ Contact less technology
- ✓ RFID readers and transponders are ISO 15693 compliant this allows a open system design considering the future expand abilities



Scope for expandability

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- Identity
- Time
- Perimeter Access
- Payroll
- Visitor
- Time Sheet (Project Resource Tracking)
- Library Management
- File
- PC Login
- Canteen Resource Management
- Car park Management
- Vending Machine Management
- Document Management
- Asset Tracking
- Vehicle Tracking



Conclusion

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RFID excel in the arena of security, speed and the data updating parameters when compared with the traditionally available systems of Library Management. This enables the system to be error free and expandable to any level based on the requirement specification. These make RFID one of the next generation automatic identification technologies for a wide range of businesses and industries in the Library Management arena.

These systems enable accurate data collection at various levels and eliminate the inaccuracies that are caused by most traditional systems. The seamless data transport capability enables to expand it to areas like Payroll, Project Resource Tracking (Project Timesheet), Human Resource Management, Financial Management, etc. with utmost accuracy and in real time.

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