



Mini Project Synopsis

Sem-I, Batch 2025-27

“Smart Library Management System (AI Enabled)”

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Contents

1. **Project Title** – Smart Library Management System
(AI Enabled)

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Identification of Problem in Existing Systems:

Traditional library systems, while functional, are often reliant on outdated, manual methods for managing essential tasks such as issuing and returning books, tracking overdue items, and managing inventory. These traditional systems face several challenges:

- **Data Loss and Human Errors:** Manual entries are prone to mistakes, such as incorrect book tracking or miscalculations of fines. These errors can lead to a loss of trust and errors in reporting.
- **Inefficiency:** Staff are required to dedicate significant time to repetitive tasks like issuing books, calculating fines, and updating inventory, leading to longer wait times for users and slower processing.
- **Lack of Personalization:** Traditional systems do not offer personalized recommendations or user-specific experiences. Library users are typically unaware of what books might interest them, limiting their engagement with available resources.
- **Manual Book Management:** Keeping track of books, their availability, and overdue status is done manually, which can lead to incorrect inventory counts, untracked overdue books, or misplaced resources.
- **Challenges with Reporting:** Generating detailed reports about library usage, overdue books, and inventory management often requires manual intervention and takes up significant time.



Proposed System:

The Smart Library Management System (SLMS) aims to address these limitations by automating and modernizing library management processes. The system will replace the current manual, paper-based operations with a digital, real-time solution. The proposed system offers the following key features and advantages:

Key Advantages include:

- Automated Book Issuing and Returning
- Real-Time Stock Management and Fine Calculation
- AI-Based Personalized Book Recommendations
- User-Friendly Graphical Interface (GUI)
- Role-Based Access Control (RBAC)
- Secure Login and Registration
- Minimal Chance of Miscalculation or Corruption
- Improved Reporting and Analytics
- Multi-User Accessibility
- Scalability



Scope of Project:

The Smart Library Management System (AI-Enabled) is a comprehensive desktop application built using Python with a GUI built in Tkinter/CTkinter for ease of use. The backend database is managed through MySQL, ensuring data security and scalability. Key functionalities of the system include:

Book Management:

Add, update, and remove books from the library catalog. Track book details like title, author, genre, availability status, and condition.

User Management:

Manage users, including borrowers, librarians, and vendors. Create and maintain user profiles, manage their roles, and track borrowing activity.

Transaction Management:

Handle book issuance, returns, and fines automatically. Record all transactions for easy retrieval and auditing.

AI-Based Recommendations:

A content-based filtering algorithm that suggests books to users based on their borrowing history. The system can be further enhanced by integrating collaborative filtering or hybrid recommendation models as the system evolves.

Reporting and Analytics:

Generate and display detailed reports on library operations, including overdue books, user activity, book usage frequency, and inventory status.



Technologies Used:

Software Specifications (While developing)-

- Front End: Python (Tkinter / CTkinter for GUI)
- Back End: Xampp for localhost MySQL Database
- IDE: Visual Studio Code & PyCharm
- Operating System: Windows 11
- Version Control: GitHub

Hardware Specifications (While developing)-

- Processor: Intel i5 gen 12
- Ram: 16gb
- Diskspace: 512gb SS



Modules:

Login and Registration Module:

Provides secure login for Librarians, Borrowers, and Vendors, ensuring role-based access. New users can register, and credentials are validated through the MySQL database for secure authentication.

Book Management Module:

Allows librarians to add, update, and delete books, manage categories, authors, and stock. It keeps the library catalog accurate and up-to-date by automatically tracking book availability and stock.

User Borrowing Module:

Manages the issuance and return of books, tracks due dates, and calculates fines for overdue books automatically. It ensures accurate transaction records and real-time stock updates.

Database Module:

Stores user details, book information, transaction history, and inventory in a MySQL database. It ensures secure and efficient data retrieval, supporting fast searches and updates.

Search and Recommendation Module:

Allows users to search books by title, author, or genre. AI-based recommendations suggest books based on a user's borrowing history, enhancing personalized book discovery.

Report Generator Module:

Generates reports on book usage, overdue items, and user activity. It helps librarians make informed decisions about library management and resources.

GUI Module:

Provides an intuitive user interface using Tkinter/CTkinter, enabling easy navigation and access to all system functionalities for librarians, borrowers, and vendors.



Summary Table for Modules:

Module	Module Name	Description
1	Login and Registration Module	Provides secure authentication for Librarian, Borrower, and Vendor. Allows new users to register and existing users to log in. Ensures role-based access to different functionalities.
2	Book Management Module	Enables the librarian to add, update, and delete books, manage categories, authors, and stock quantities.
3	User Borrowing Module	Manages the issuing and returning of books. Automatically calculates fines for overdue returns.
4	Database Module	Maintains user records, book inventory, transaction history, and stock information in a structured MySQL database.
5	Search and Recommendation Module	Allows users to search books by title, author, or genre. Uses AI-based content filtering to recommend books to borrowers.
6	Report Generator Module	Generates detailed reports such as most borrowed books, overdue items, and user activity statistics. Helps in administrative decisions.
7	GUI Module	Provides an interactive and intuitive user interface using Tkinter/CTkinter for all modules. Ensures easy navigation for all users.



Actors and Operations:

Admin:

Super-administrator with full control over the system. Can add, update, or delete books, manage the database, generate reports, and manage user roles and permissions.

Librarian:

Manages library operations. Can add, update, or delete books, and handle book issuing and returns. Oversees day-to-day library tasks and user transactions.

Reader:

A library user who can register, log in, borrow and return books, view fines, search for books, and receive AI-based book recommendations.

Vendor:

A supplier of books who can register, log in, update supplied stock, manage delivery details, and view demand reports to track library needs.

Summary Table for Actors and their Operations

Sr No:	Actor	Role	Operations Performed
1	Admin	Super-Administrator of the system	Add/update/delete books, manage database, generate reports, manage users.
2	Librarian	Manager of the system	Add/update/delete books, issue and return books.
3	Reader	Library user	Register and log in, borrow and return books, view fines, search and get AI-based recommendations.
4	Vendor	Supplier of books	Register and log in, update supplied stock, manage delivery details, view demand reports.



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