

STOCK TAKE ROBOT

AI VISUAL INVENTORY COUNTING SOLUTION



AI INTELLIGENT

We Connect Everything to improve the
quality of life



OVERVIEW

With the extensive application of information technology in libraries, most reader services and management scenarios have become increasingly convenient and efficient. However, the inventory counting of library collections and the methods for readers to find books have not seen significant improvements. Relying on manual inventory checks and shelf-order methods has made it increasingly difficult to grasp the status of the collection. Readers also find it increasingly challenging to locate books, often knowing that a book exists but being unable to find it.



The AI Visual Inventory System replaces traditional manual methods with smart robots, integrating AI visual analysis to achieve dynamic, real-time perception of bookshelves. This brings a revolutionary experience to libraries in terms of shelf book perception analysis and assists readers in finding books.



SYSTEM ARCHITECTURE

The visual inventory system consists of three main components: front-end recognition and data collection, data analysis and processing, and role application scenarios. The role application scenarios include three roles: librarians, readers, and administrators. The system architecture is illustrated in the following diagram:

(1) Front-end stock take robot collects real-time images of bookshelves.

The bookshelf area can be monitored, and data on the books on the shelves can be recognized and collected using robots or handheld terminals.



(2) Real-time analysis and processing of inventory data.

The data collected from the front end is matched, corrected, and optimized to generate the final inventory data. The computation results are then output to the management backend.



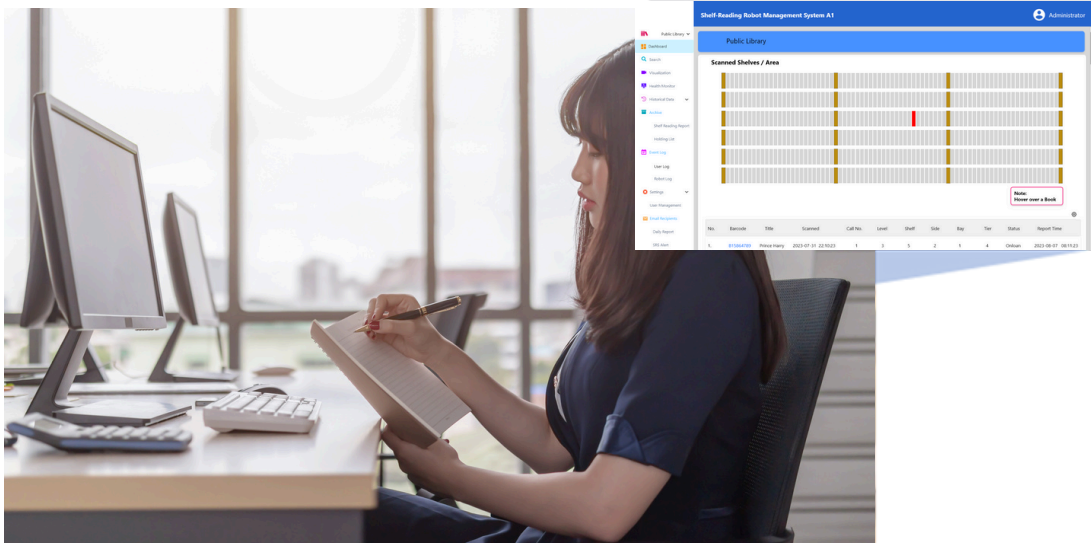
(3) Smart shelving, returning, sorting, and rearranging of books.

Automatically identify and provide intelligent guidance for books that need to be shelved, sorted, or rearranged.



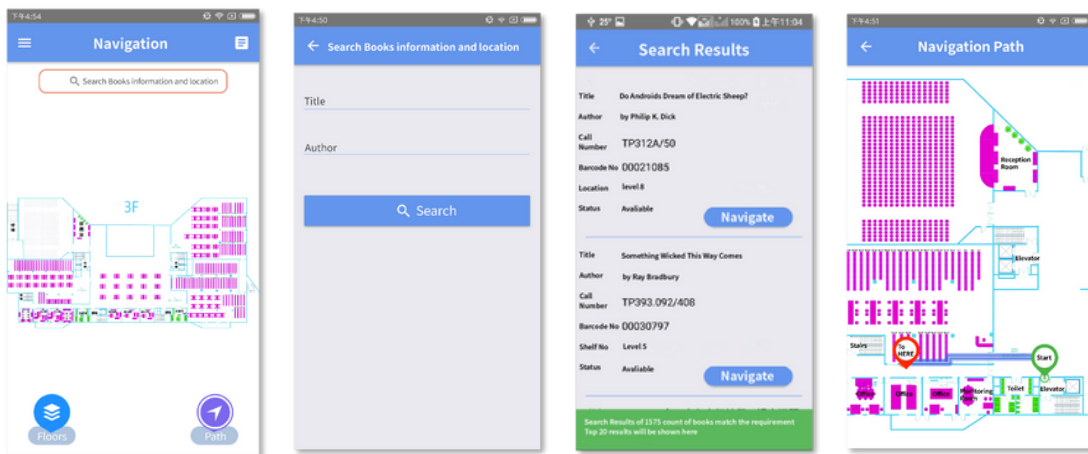
(4) Visual Management Dashboard for Staff.

Staff can use the management dashboard to visualize and manage the library's bookshelf data, including real-time information on books on the shelves, mis-shelved books, incorrect order, and books that are checked out.



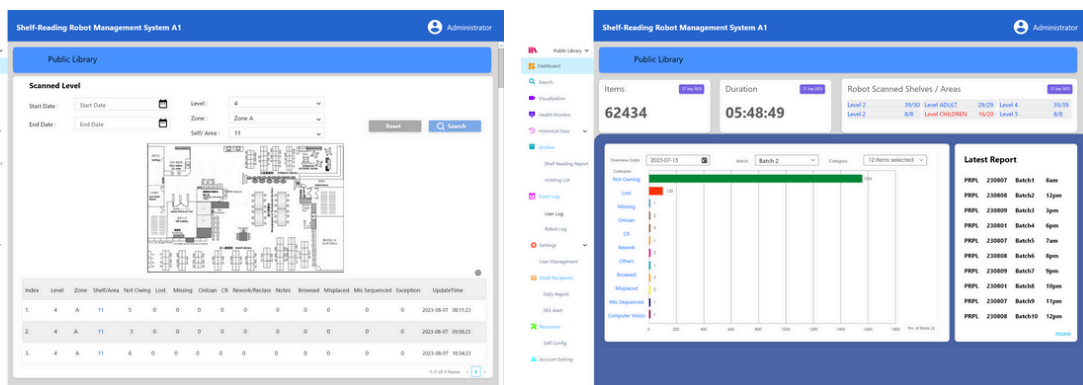
(5) Intelligent Book-Searching Application for Readers.

This application provides book location and retrieval features during searches and virtual library browsing. It retrieves corresponding inventory data, bookshelf location information, and in-library navigation routes, presenting this information to readers in a visual format.



(6) Data Dashboard and Intelligent Decision-Making Functions for Administrators.

This feature summarizes and presents the visual inventory data through statistical and multidimensional analysis. It also handles the access authentication, status monitoring, unified management, task scheduling, and patrol route management of stock take robots.

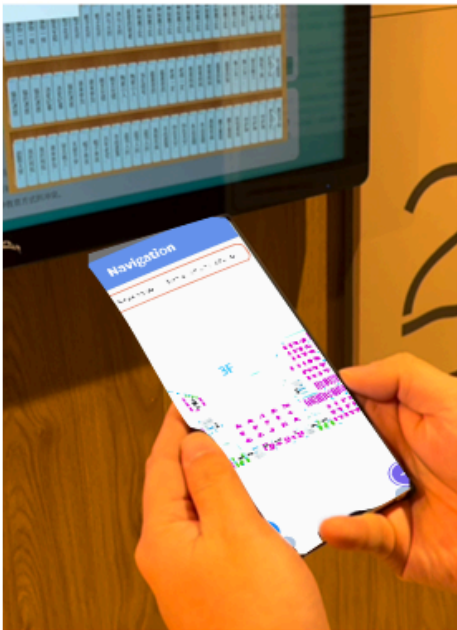


AUTOMATED DATA COLLECTION OF BOOKS ON THE SHELVES.



The bookshelf area robots automatically conduct periodic polling and capture images based on the set time intervals and coverage areas. They upload the inventory image data to the central server for analysis and processing. Once set up, no manual intervention is required. If any equipment malfunctions, the system will issue an alert to notify technicians for inspection and maintenance.

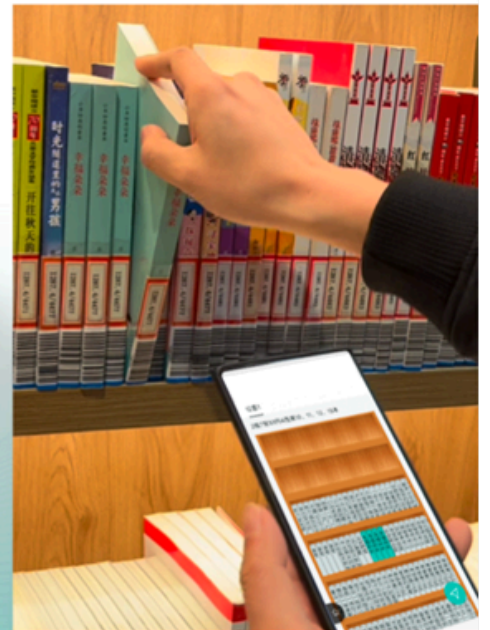
PRECISE BOOK FINDING AND ROUTE GUIDANCE



Book Searching

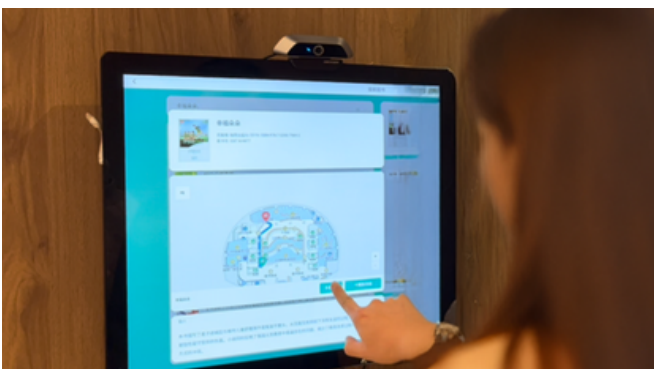


Real time navigation



Precise Location of Virtual Bookshelves

Real-time shelf location information display and a 'Find Books' function button will be added to the existing library self-service kiosks. Clicking the button will provide a precise book location display and real-time route guidance.

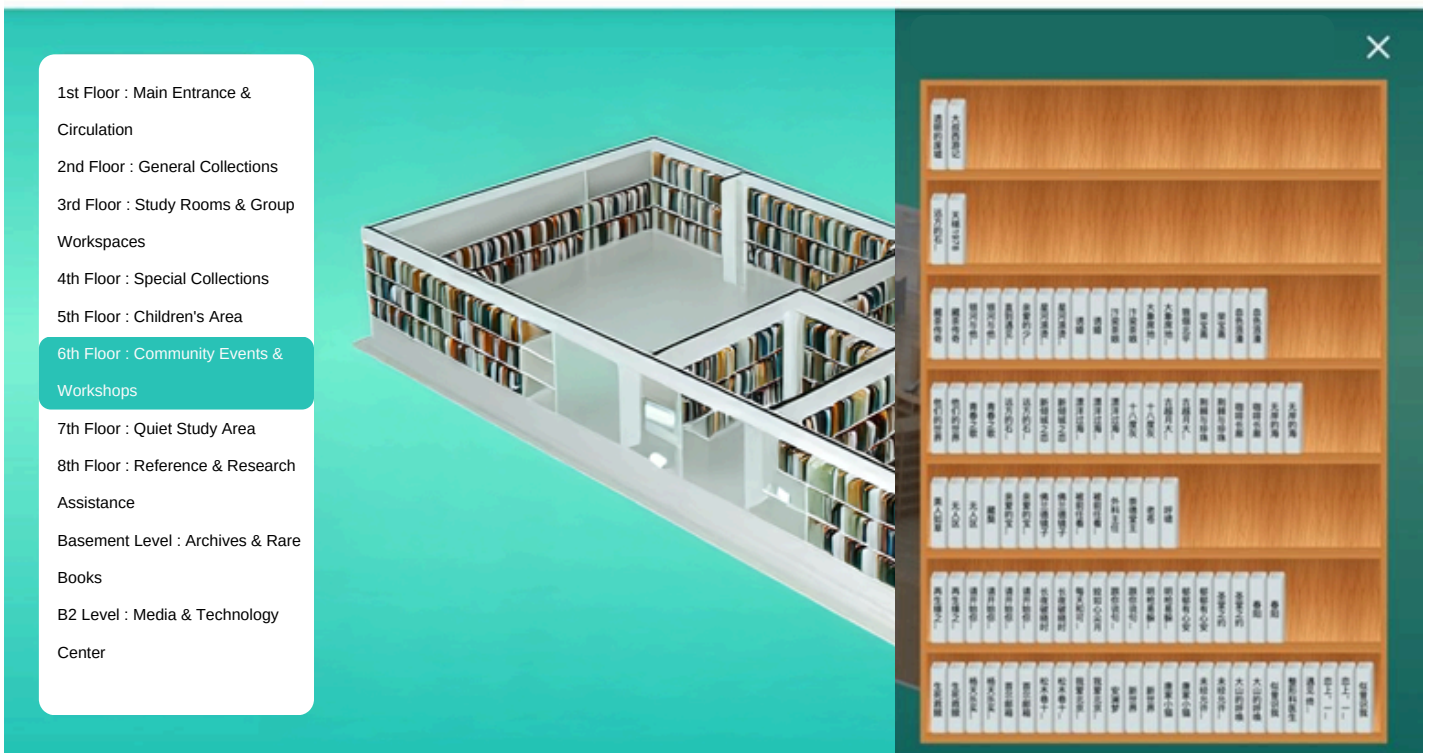


After retrieving information on the self-service kiosk within the venue, users can scan a QR code with their mobile phones for visual book finding.



VIRTUAL BOOKSHELF

Readers can not only find out in real-time whether books are on the shelf and their specific locations through the book search function, but they can also browse all the available books in the library using the virtual bookshelf feature, making it easier to find their desired titles.





LIBRARIAN

Smart Shelving

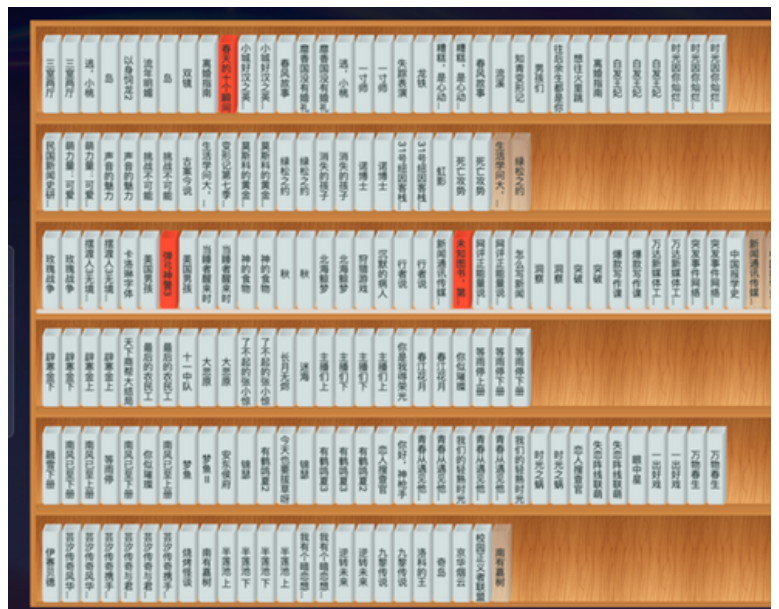
When new or returned books are shelved, the system intelligently classifies and assigns them to their respective shelf locations. After being placed back on the shelves, the system automatically recognizes the completion of shelving and synchronously displays the book's location to readers.



Smart Sequencing

The system intelligently prompts which shelves need timely reordering. Based on the system's suggestions, if books are found to be incorrectly shelved or out of order, adjustments can be made on-site. The system automatically synchronizes the results of the reordering.

Bookshelf	Location	Mis-shelving rate	Date / Time
1st Floor, Row 24	Children's Corner	97.7%	2022-08-16 17:38:08
1st Floor, Row 51	Reference Area	95.2%	2022-08-15 09:02:16
1st Floor, Row 39	Reference Area	26.8%	2022-07-20 16:02:43
1st Floor, Row 27	Children's Corner	26.3%	2022-08-02 16:59:53
1st Floor, Row 10	Children's Corner	8.4%	2022-08-17 17:56:45
1st Floor, Row 9	Children's Corner	8.3%	2022-08-17 09:35:43





LIBRARIAN

Unloading of books

The system calculates the current capacity of the shelves and reminds the administrator to perform targeted re-shelving.



After the books are moved, simply change the call number range in the shelf management system. Following an immediate inventory check, the updates can be made.

Information

2nd Floor, Double Layer
Row 24

Please Select

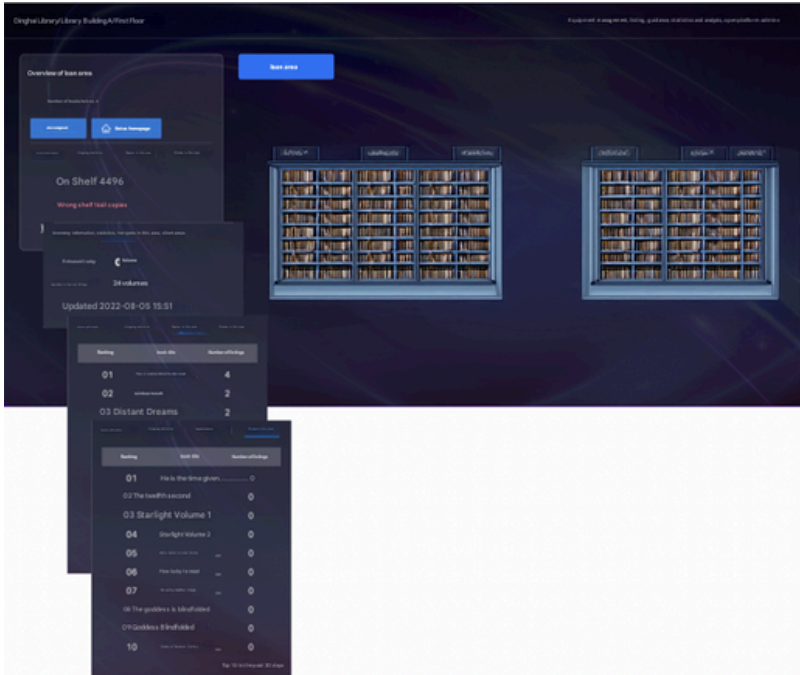
Shelf 1, Level 1	Shelf 2, Level 1	Shelf 3, Level 1	Shelf 4, Level 1	Shelf 5, Level 1	Shelf 6, Level 1	Shelf 7, Level 1
Shelf 1, Level 2	Shelf 2, Level 2	Shelf 3, Level 2	Shelf 4, Level 2	Shelf 5, Level 2	Shelf 6, Level 2	Shelf 7, Level 2
Shelf 1, Level 3	Shelf 2, Level 3	Shelf 3, Level 3	Shelf 4, Level 3	Shelf 5, Level 3	Shelf 6, Level 3	Shelf 7, Level 3
Shelf 1, Level 4	Shelf 2, Level 4	Shelf 3, Level 4	Shelf 4, Level 4	Shelf 5, Level 4	Shelf 6, Level 4	Shelf 7, Level 4
Shelf 1, Level 5	Shelf 2, Level 5	Shelf 3, Level 5	Shelf 4, Level 5	Shelf 5, Level 5	Shelf 6, Level 5	Shelf 7, Level 5
Shelf 1, Level 6	Shelf 2, Level 6	Shelf 3, Level 6	Shelf 4, Level 6	Shelf 5, Level 6	Shelf 6, Level 6	Shelf 7, Level 6

Row 24, Shelf 1, Level 1 Edit Call Number

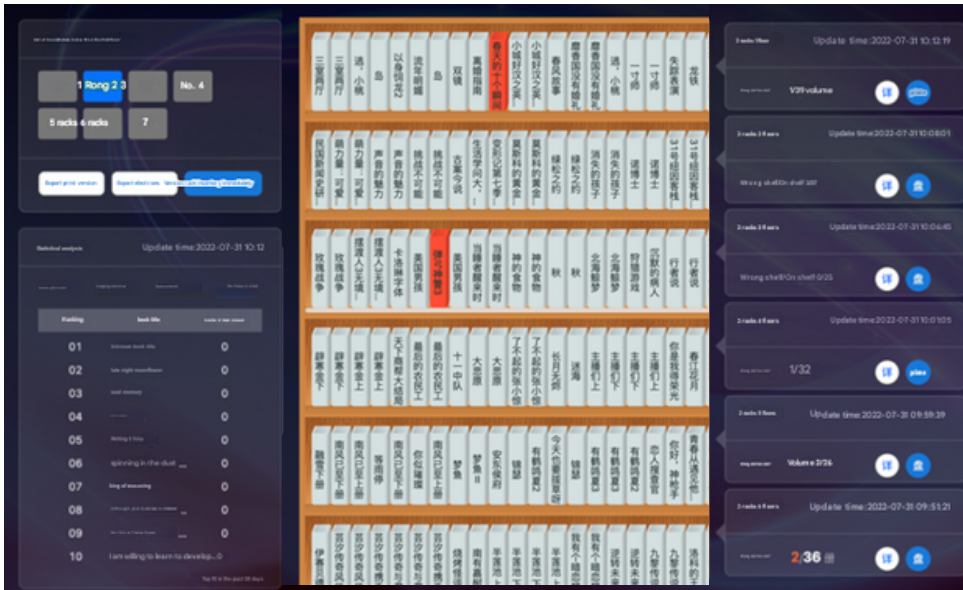


VISUAL MANAGEMENT

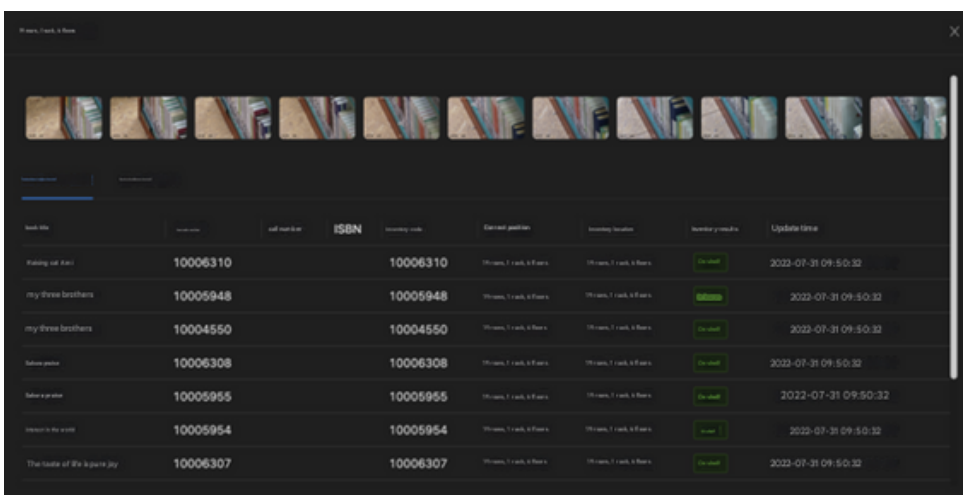
Librarians can monitor the inventory status of each area and shelf in real-time, supporting one-click export of inventory data. They can also manually initiate precise real-time inventory checks down to specific shelves and compartments.



AREA INVENTORY STATISTICS

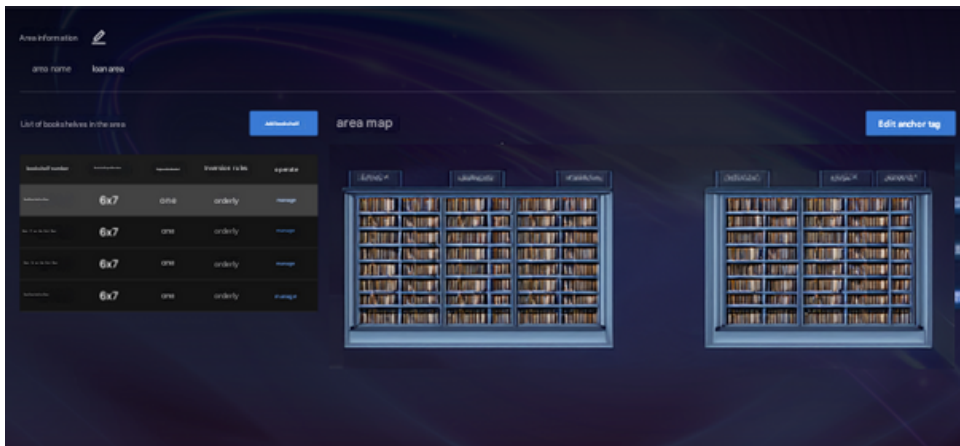


SHELF INVENTORY STATISTICS



COMPARTMENT INVENTORY DETAILS

●●● VISUAL MANAGEMENT



Librarians manage areas and shelves, with settings refined down to individual compartments



Detailed Shelf Compartment Settings

During routine inspections of the library and its shelves, librarians can use the mobile inventory management application to edit shelf information and query disorganized shelves, making the process more convenient and flexible.

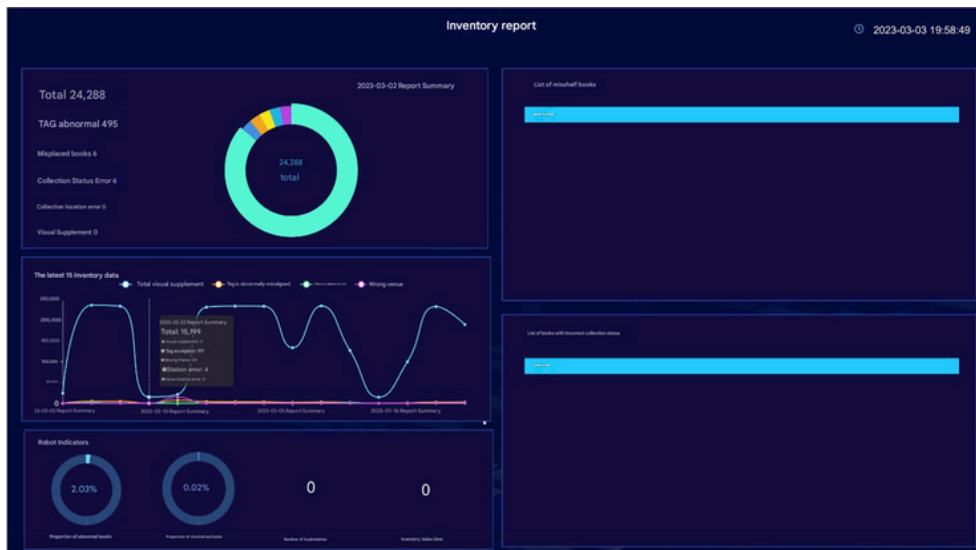




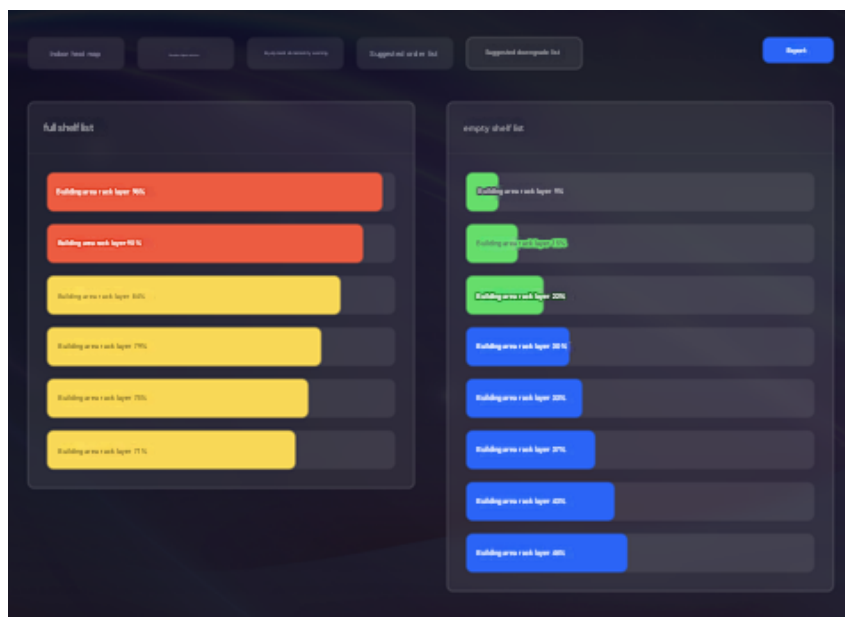
ADMINISTRATOR INTERFACE

Library Inventory Data Dashboard

- **Macro Inventory Data:** Comprehensive inventory information for the entire library.
- **Shelving Data:** Presentation of recent book shelving and trend analysis.
- **Popular Books and Area Data:** Calculation of popularity metrics based on book shelving and reader activity.
- **System Operation Data:** Status of equipment operations and dynamic updates on system inventory checks.



By analyzing real-time inventory data, the system offers valuable insights into reading trends, popularity distribution, and ranking analysis from multiple dimensions, including readers, books, shelves, and areas.



Intelligent decision-making includes daily shelf management, equipment operation and maintenance, and reader services. The system offers optimization recommendations through big data analysis, assisting librarians with work scheduling and adjustments.

ADVANTAGES

- **Multi-Terminal Collaboration:** Provides a comprehensive solution for various inventory methods based on the venue's actual conditions, including intelligent robots, and handheld devices for staff.
- **Leading Performance:** Achieves industry-leading inventory effectiveness metrics, with an accuracy rate of over 99% and a processing time of under 10 minutes per book.
- **Full-Spectrum Coverage:** Offers a highly integrated and fully visualized system experience, enabling a complete process from book asset inventory → book data integration display → intelligent book finding (for readers) and shelf management (for staff) → management data dashboard.
- **Systematic Service:** Provides a one-stop service covering the entire process, including preliminary surveys, solution construction, equipment installation and implementation, rapid debugging and launch, and after-sales service.



OPERATION AND MAINTENANCE SERVICES

1. **Regular Maintenance:** We perform routine maintenance on the visual inventory system with a three-level support team: after-sales staff, managers, and technical leaders to handle emergencies.
2. **Quarterly Inspections:** We provide on-site inspections every three months to check system performance, spot potential issues, and provide reports.
3. **Technical Support:** We aim to resolve general issues within 2 hours. If not, a technical expert will arrive within 4 hours to help.
4. **Library System Integration:** We ensure free connectivity with the library's automation system for smooth reader service.
5. **Security Assurance:** We provide security updates for software and hardware based on government safety requirements.

Consultation Services

We create a communication group for staff to quickly resolve operational and system issues with expert help.

Hardware Maintenance

We check and fix hardware problems and offer warranty services for non-human errors.

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