International University of Business Agriculture and Technology

PROJECT PROPOSAL

ON

IUBAT Library Entry Automation

Supervisor

Jubair Ahmed Nabin
Lecturer

Team Anonymous

22303142 - Md. Taher Bin Omar Hijbullah
22303089 - Hasibur Rahman
22303296 - MD. Rony Mia

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01. Executive Summary

This proposal presents a comprehensive solution to modernize the entry and PC assessment processes within IUBAT University's library and computer section. The current manual system dependent on paper logs and resulting inefficiency, poor traceability, and limited data utility. Implimanting barcode-based instant student IDs entry, React-powered user interfaces, and Django backend services, the proposed system digitizes entry tracking and introduces a real-time computer allocation framework. Students will scan their IDs to log entry, select available PCs through an interactive layout, and initiate auto-deactivation upon session completion. The system is designed for scalability, security, and minimal disruption, offering offline redundancy and future integration with cameras for efficient resource allocation using central databases. By this workflows and enhancing monitoring capabilities, this solution promises improved user experience, administrative control, and data-driven decision-making across library operations.

Background Information: IUBAT University's library and computer section currently rely on manual processes for student entry and tracking. Current system unable to verify authorized users, no reliable data for analysis, tracing and investigation. Students must write their ID, name, and entry time into physical logs for Library and pc section both areas. This causes delays and long queues, data inconsistency, and difficulty in tracing activity during incidents. Students have ID cards with barcodes, which present an opportunity for digital library entry system automation.

Figure 1: IUBAT Library Different Areas

02. Problem Statement

Despite being part of a modern academic environment, IUBAT University's library and computer section still rely on outdated manual processes. These create major challenges:

- **Long queues and slow entry:** Students must manually sign in, causing delays and frustration.
- **Hardcopy records:** Library data is stored in notebooks, making it hard to search, audit, or analyze.
- **No PC usage tracking:** There's no system to log which student used which PC, when, or for how long.
- **Security gaps:** In case of incidents, it's difficult to identify responsible users due to unreliable records.
- **Staff overload:** Manual logging consumes staff time and makes PC maintenance harder.

► Student Needs

Based on the survey conducted with 132 student responses, the key needs and main points are clear and align with the project's objectives.

- **Automation is highly desired:** A vast majority of students (89.6%) would prefer to scan their ID to enter the library instead of writing it down.
- **Long queues and manual signing are major issues:** The most significant issues students face during entry are long queues (64.6% of responses) and forgetting to sign manually (33.3%).
- **Live PC status is a priority:** When asked about desired features, 95.8% of students requested an ID scan entry system and 54.2% wanted a live PC availability view.
- **Faulty PCs and tracking are concerns:** Key issues with the e-library PCs are that faulty PCs are not fixed (35.4% of responses) and students can't find free PCs (29.2%). The option to report a faulty PC was a requested feature from 52.1% of students.
- **Mobile access is a future requirement:** Almost all students (89.6%) use a smartphone regularly, and 95.7% would like the option to access the system via a mobile device in the future.

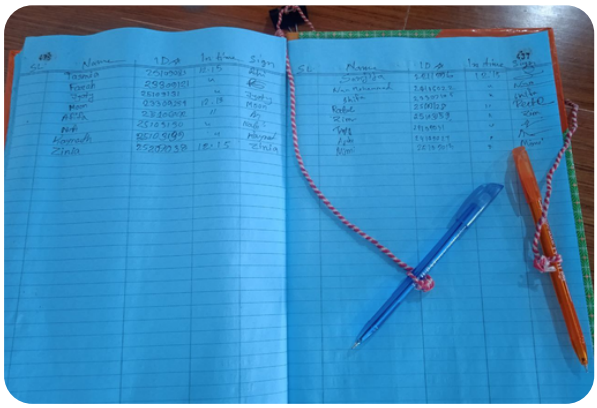


Figure 2: IUBAT Library Inefficient Hardcopy Records

► Stakeholders, Librarian and Admin Needs

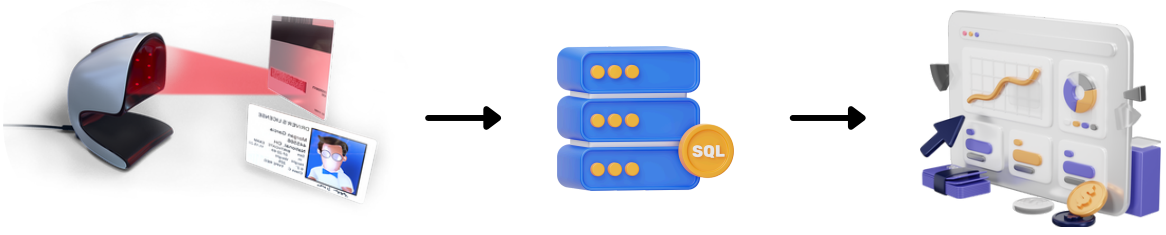
Based on the project's problem statement and objectives, the needs for the library and IT staff are centered on improving operational efficiency and data management:

- **Digitized Data and Reporting:** The core need is to move away from hardcopy records to a digital system that allows for easy searching, filtering, and analysis of data. This includes the ability to generate comprehensive reports (e.g., time-based and student-based usage reports).
- **Enhanced Security and Traceability:** Staff requires a reliable way to link a specific student to their library entry or PC usage session for better accountability and incident resolution. This includes a system to manage and enforce a student ban list.
- **Reduced Operational Burden:** The automated system should reduce the time and effort spent on manually maintaining logbooks and data.
- **Effective PC Management:** Admins need the ability to monitor the status of all PCs in real-time, mark them as "dumb" or "out-of-order," and track complaints. The system's SCADA-style layout is specifically designed to help PC technicians identify which PCs need fixing, saving them time.
- **Data-Driven Decision Making:** The collected data should be usable for analyzing usage patterns, which can help in future planning and resource allocation.

03. Objectives

This project aims to digitize student entry and PC usage tracking at IUBAT University's library and computer section. By replacing manual logs with barcode-based ID verification and automated PC assignment, it enhances efficiency, security, and data accuracy while laying the groundwork for broader campus digitization.

- **Automate library entry and computer section using barcode ID scan**
- **Implement digital PC assign to individual, E-Library management system**
- **Enable real-time entry logging and monitor updates**
- **Provide admin dashboard for analytics and management**
- **Ensure a low-delay experience for students**



04. Implemented Methodology

From SDLC Models, We're following Agile methodology. Our approach focused on replacing manual data entry with digital ID scanning. Barcode scanners, paired with a software stack (React + Django), fetch student data from the database and log entries in real-time. A live SCADA-style layout displays computer availability, allowing students to select and assign PCs. The system is modular and was designed for incremental rollout

05: Progress & Resources

Current progress made on the IUBAT Smart Library Automation System:

- Library Entry Management: The system currently includes student identification through ID verification, real-time entry and exit tracking, and live occupancy monitoring. A student database has been populated with 43 IUBAT University students.
- E-Library PC Management: We have implemented PC availability status monitoring, a student-PC assignment system, and check-in and check-out functionality. The system also tracks PC usage time and manages hardware status (operational/out-of-order).
- Administrative Interface: The admin interface features secure admin authentication, a comprehensive reporting system, and the ability to generate time-based and student specific usage reports.
- Technical Specifications:
    - Backend: The backend is built on Django 4.2.23 with Django REST Framework. It uses SQLite for development and is configured for PostgreSQL in production. Authentication is session-based, and it includes CORS for frontend integration.
    - Frontend: The frontend is a React.js application with a responsive design and gradient styling. It uses the Fetch API for backend communication

► Probable Resources and Hardware

A successful deployment of this system requires both software and hardware resources. Below is a list of probable items needed.

- **Barcode Scanner:** To enable the barcode-based ID entry system, 2 reliable USB barcode scanner will be needed for each entry and exit point in the main library and the e-library.
- **Dedicated PC/Server:** A dedicated computer is required to run the backend application, host the database, and manage the administrative dashboard.
- **Two Monitor:** One for entry and another for exit and e-library access.
- **Networking Hardware:** Stable and reliable internet access is crucial for the system's real time functionality. This includes network cables, switches, and potentially a dedicated router or access point for the system

06: Future Scope & Scalability

Our library automation system is designed not just for today's needs, but with a clear path for future growth and innovation. Planned enhancements include:

- **Advanced Reporting:** Generate detailed reports on library usage daily, weekly, or by section to support data-driven decisions.
- **Personalized User Dashboard:** Each user will have access to their own dashboard to view activity, manage reservations, and generate reports.
- **Live Seat Monitoring:** Real-time updates on chair availability using smart camera detection, helping users find seats instantly.
- **Section-Wise Layout:** A visual map of the library showing live availability and allowing users to book specific sections.
- **Book Borrowing System:** Track lending and returns, with automatic fine calculation for overdue items.
- **CCTV Integration:** Add surveillance feeds for enhanced security and traceability within the library.
- **Role-Based Access Control:** Different permissions for admins, staff, and students to ensure secure and efficient management.
- **LAN & Cloud Flexibility:** The system can run on local servers or scale to cloud platforms, depending on institutional needs.
- **Modular Expansion:** Easily extendable to include new facilities, AI features, or integrations with other campus systems.

07: System Workflow

A user lands on the default page where the system displays a login success message upon scanning their ID. If the user is not registered, a popup prompts them to complete registration. Once logged in, the system asks whether the user wants to access the PC section. If they choose yes, they are redirected to the PC selection layout. If they choose no, they remain on the default page or proceed with other available options. Admins can log in from the same default layout to access the admin dashboard, where they can register new users and generate system reports.

1. Landing Page The user lands on the Default Layout, which serves the id scan page.
2. ID Scanning & Login As the user scans their ID, the system checks their registration status:
3. If registered, a "Welcome" message appears, confirming successful login.
4. If not registered, a popup prompts unauthorized, which again leads to default scan page.
5. PC Section Access The user is asked whether they want to use the PC section:
6. If YES, they're directed to the PC Selection Layout to choose a workstation.
7. If NO, they continue browsing or exit the system.

8. Admin Access Admins can log in directly from the default layout to access the Admin Dashboard.
9. Admin Functions Inside the dashboard, admins can:
10. Register new members to the system
11. Generate reports on usage, activity, and system performance

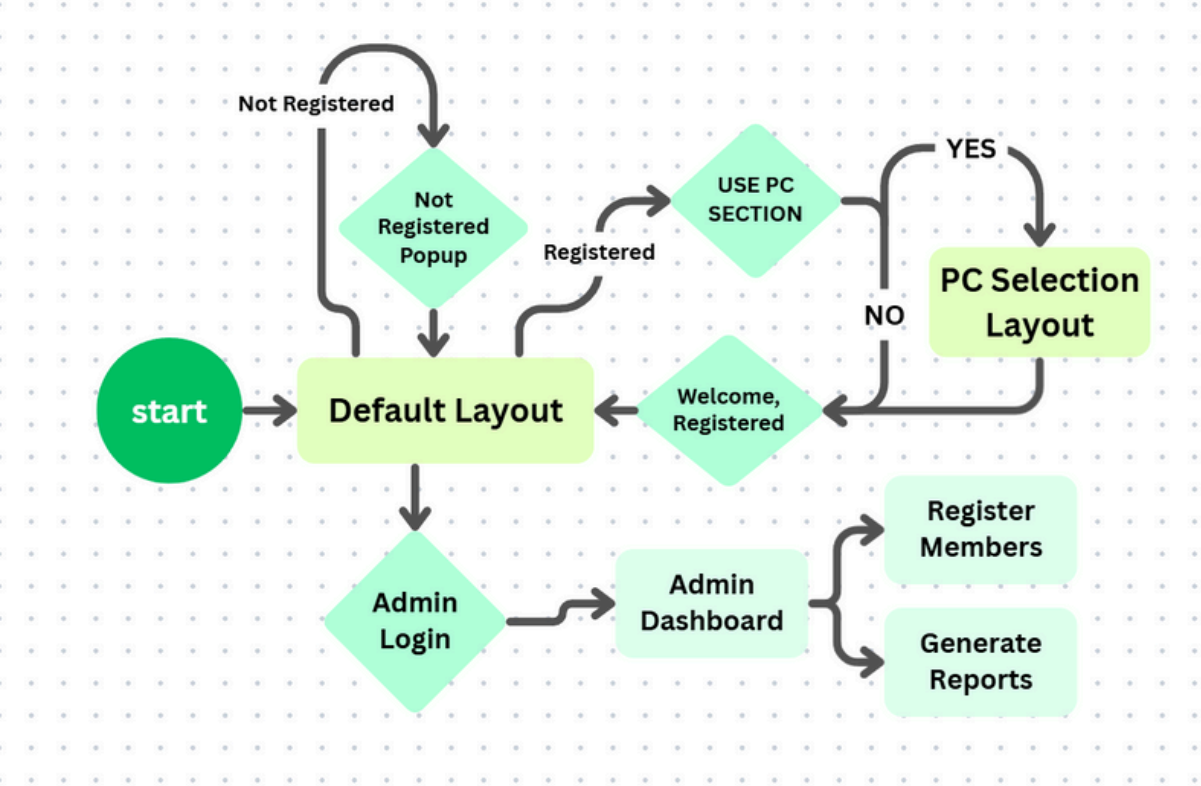


Figure 3: IUBAT Library Entry System Workflow

08: System Features

The system is designed to automate student access and PC usage in the library through a dual-monitor, ID-based workflow that ensures speed, accuracy, and control.

- **Dual Monitor Setup:** Entry monitor handles ID validation; service monitor manages PC selection, reservation, and exit.
- **ID-Based Access Control:** Barcode scanning verifies users and restricts unauthorized access.
- **Optional PC Usage:** Students may enter without using a PC or proceed to select one via the service monitor.
- **Real-Time PC Status:** Displays available, busy, and faulty PCs for easy selection.
- **Reservation Management:** Users can cancel PC reservations after use by scanning again.
- **Exit Procedure:** Students scan and confirm exit through the service monitor.
- **Admin Dashboard:** Provides analytics, peak hour tracking, and report generation for system oversight.

09: Software Architecture

We'll prototype the barcode-based entry system using React, Django, and SQLite + PostgreSQL. On deployment, it will read user data from the university's MySQL database in read-only mode. Matched users will be synced into our own database for entry logging and CRUD operations.

10: Conclusion

The IUBAT Library Automation System presents a practical and scalable solution for modernizing library access through barcode-based entry. By combining a robust tech stack with thoughtful UI/UX design, the system ensures secure integration with existing university databases while delivering a seamless experience for users and administrators alike. Its modular architecture supports future enhancements, and its emphasis on usability makes it adaptable to evolving institutional needs. This initiative not only improves operational efficiency but also lays the groundwork for broader automation across campus services. With careful implementation and iterative refinement, the system is poised to become a reliable cornerstone of IUBAT's digital infrastructure.