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Smart College Inventory Management System

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ABSTRACT: The Smart College Inventory Management System is a desktop-based software application developed to manage and monitor inventory used in college laboratories and workshops efficiently. In many educational institutions, inventory is still maintained using manual registers or basic spreadsheets, which often leads to issues such as data duplication, incorrect entries, data loss, and difficulty in tracking current stock status. To address these problems, the proposed system provides an automated, secure, and user-friendly inventory management solution. The system is developed using Python, with Tkinter used to design a simple and interactive graphical user interface. It starts with a secure user login module that verifies credentials, ensuring only authorized users can access the system and modify inventory data. After successful authentication, users can access different modules in a structured manner. The core of the system is the Inventory Management Module, which consists of four sub-modules: Tool Management, Machine Management, Material Management, and Manual Management. These modules allow users to add, update, delete, and view inventory records such as tools, machines, consumable materials, and workshop manuals. All inventory operations follow CRUD (Create, Read, Update, Delete) functionality. The system uses a SQLite database for reliable long-term data storage and quick retrieval, making it suitable for small to medium-sized institutions. Additionally, the system can generate graphical reports and charts using Matplotlib, helping administrators analyze stock availability, usage trends, and inventory status. Its modular design supports future enhancements such as barcode scanning or cloud integration, making the system scalable and easy to maintain.

KEYWORDS: Smart College Inventory Management System (SCIMS), Admin (Teacher, Staff)

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I. INTRODUCTION

The rapid growth of colleges and increasing number of laboratory equipment, tools, and materials have made inventory management more complex. Many institutions still use manual registers and paper-based records, which often cause errors, data loss, mismanagement of assets, and difficulty in tracking stock availability. Different departments manage their inventories separately, leading to poor coordination and inefficient use of resources. To solve these problems, the Smart College Inventory Management System (IMS) is proposed as a digital solution that helps manage assets, track stock, monitor issue and return records, and generate reports in real time. The system improves accuracy, transparency, and efficiency by using a centralized database and secure login system. Its main objective is to reduce manual work, prevent errors, and ensure better utilization of college resources while supporting future scalability and technological improvements

II. EXISTING SYSTEM

Currently, most colleges maintain inventories using registers or basic spreadsheets. The primary limitations include:

- **Limited Computer Knowledge:** Staff may require basic training to use the system.
- **System Dependence:** Any failure in computers or software can disrupt access to data.
- **Small Scale:** Most existing systems are suitable only for smaller institutions.
- **Security Risks:** Without proper password protection and backups, data is vulnerable.

III. PROPOSED SYSTEM

The proposed Smart College Inventory Management System (IMS) is a centralized, web-based application designed to digitize and automate inventory operations within a college. The system allows administrators and authorized staff to add, update, delete, and monitor inventory items such as laboratory equipment, tools, and materials in real time. It maintains detailed records of asset allocation, stock availability, and issue-return transactions through a secure relational database. Role-Based Access Control (RBAC) ensures that administrative functions and departmental operations are properly separated to prevent unauthorized access. The system also generates automated reports including stock summaries, usage history, and department-wise inventory distribution. By replacing manual record-keeping with a structured digital platform, the proposed system improves accuracy, transparency, efficiency, and resource utilization within the institution.

IV. LITERATURE REVIEW

Existing inventory management systems primarily focus on commercial warehouses and retail businesses, often emphasizing large-scale supply chain optimization and profit-oriented stock control. However, limited attention has been given to institution-specific inventory platforms designed for colleges operating within a closed administrative network. Prior research highlights the importance of centralized database systems, secure authentication mechanisms, and automated reporting tools in improving inventory accuracy and transparency. Studies also emphasize challenges such as data inconsistency, lack of real-time tracking, and poor coordination between departments.

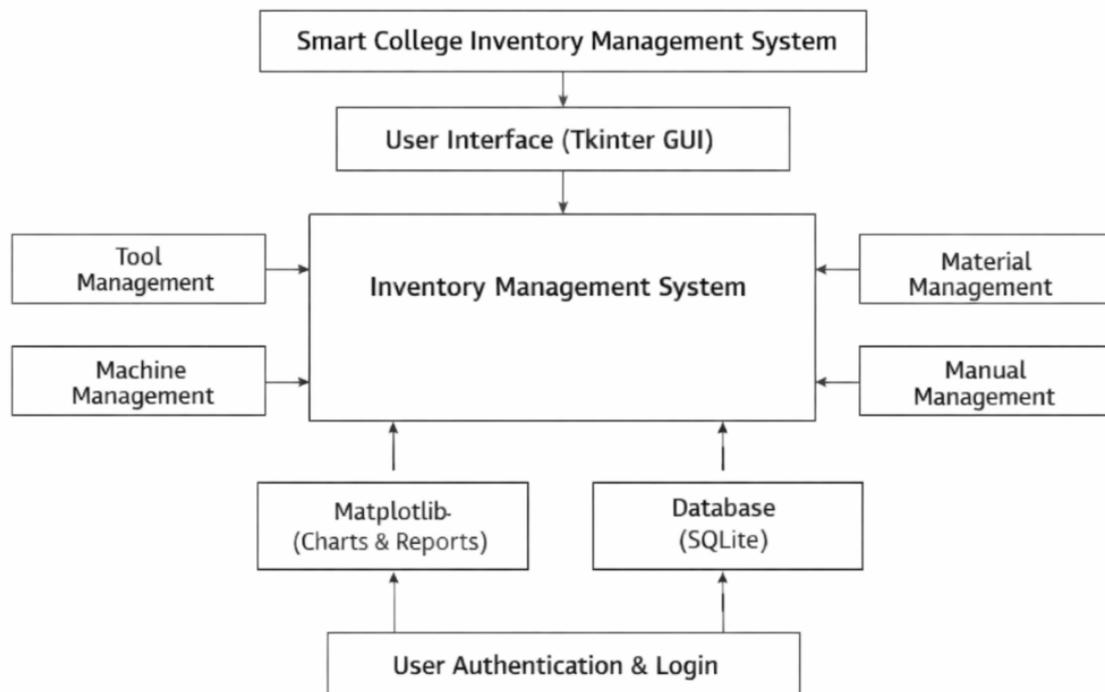
Title: Design and Implementation of Web-Based Inventory Management Systems in Educational Institutions

Authors: Various researchers in academic inventory system studies

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This paper explains digital inventory systems for colleges, including database management and secure login features. It highlights problems in manual systems like duplicate records and poor tracking. However, there is still a need for a secure, scalable, and user-friendly Smart College IMS with real-time monitoring

V. SYSTEM ARCHITECTURE & BLOCK DIAGRAM



VI. OBJECTIVES

- **Accurate Inventory Control:** Maintain real-time and up-to-date records of tools, machines, equipment, and materials to avoid duplication, loss, or mismanagement.
- **Reduce Manual Effort:** Automate inventory processes such as item entry, stock updates, and issue-return tracking to minimize paperwork and human errors.
- **Transparency:** Provide clear visibility of stock availability, borrowing history, and return status for all departments through a centralized system.
- **Decision Support:** Generate detailed reports and graphical charts to help management in planning purchases, monitoring usage trends, and maintaining optimal stock levels.
- **Secure Access:** Implement role-based authentication to ensure that only authorized users can access, update, or manage inventory data, thereby maintaining data security and integrity.

VII. RESULTS AND IMPLEMENTATION

The system enables real-time management of inventory data, reduces manual errors, and improves overall workflow efficiency within the college. Administrators can generate detailed reports such as stock availability, low-stock alerts, issue-return history, and department-wise inventory summaries. The system also provides graphical visualization of data through charts and reports, helping management easily understand usage patterns and trends. Automated record updates ensure accurate tracking of assets and prevent duplication or data loss. Role-based login enhances security by restricting unauthorized access. Overall, the system supports better decision-making, efficient resource utilization, timely stock replenishment, and transparent inventory monitoring across all departments.

VIII. CONCLUSION AND FUTURE SCOPE

The Smart College Inventory Management System provides a structured and efficient approach to managing institutional assets and stock records. The layered architecture ensures scalability, maintainability, and secure data handling. The implementation of centralized database management and role-based access control improves accuracy, transparency, and operational efficiency. The system reduces manual work and supports better resource utilization within the college. Future enhancements may include integration of barcode or RFID technology for faster asset tracking, cloud-based deployment for remote access, data analytics for predictive stock management, and mobile application support for improved accessibility and convenience.

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