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Web Application for WIFI based Library Book Locator

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Abstract - Utilizing Wi-Fi and RFID for Efficient Library Book Search and Navigation. In an era of information overload, efficient navigation within physical libraries remains a challenge. This project proposes a novel Wi-Fi-based book locator system utilizing Radio-Frequency Identification (RFID) tags and existing library infrastructure. Users access a mobile app or web portal to search for books, triggering location queries to Wi-Fi access points equipped with RFID readers. The system identifies and pinpoints the nearest available copy, significantly reducing search time and frustration. Integration with library data provides book availability status, turn-by-turn navigation, and reservation capabilities. This innovative approach leverages existing technology to enhance user experience, optimize library organization, and foster a more productive and engaging library environment.

***Key Words*:** RFID, Libraries, Navigation , Efficiency of time

1.INTRODUCTION

In today's fast-paced world, efficiency and convenience are paramount. This is especially true in educational and research environments, where the ability to quickly and easily access information can significantly impact learning and discovery. Libraries, as repositories of knowledge, play a crucial role in these environments. However, navigating a large library to locate a specific book can often be a daunting and time-consuming task. The traditional method of searching for a book involves checking the library's catalog, identifying the book's specific location based on a complex categorization system, and then physically searching the shelves. This process can be frustrating and inefficient, particularly if the book has been misplaced or not returned to its designated spot.

2. Body of Paper

we introduce the challenges faced by library users in locating books and the inefficiencies of traditional methods. Libraries with vast collections often lack efficient indoor navigation systems. To address this problem, we propose a web application that leverages WiFi technology to assist users in finding books efficiently. This system integrates a book search engine, a real-time WiFi-based user location tracker, and an interactive map. Section2 provides a review of related works, while Section3 outlines the methodology employed. Section2 provides an overview of existing indoor navigation systems, library management software, and WiFi-based positioning technologies. Several studies have explored GPS and RFID-based solutions, but their limitations in indoor environments are noted. In contrast, WiFi-based solutions offer scalability and precision, which this study builds upon. Section3 outlines the system's architecture and technical components. The web application employs a client-server model where the client handles user interaction, and the server processes book database queries and WiFi signal triangulation. The library's floor plan is digitized and embedded with book location metadata. Subsection 3.1 describes the WiFi positioning algorithm, and Subsection 3.2 details the user interface design

Table -1: Statistical Analysis of WiFi-based Library Book Locator Usage

S. No.	Metric	Value/Observation	Description
1	Number of Users	1,200	Total number of registered users on the platform.
2	Average Search Time	2 minutes/book	Average time taken by users to locate a book.
3	Accuracy of Book Location Tracking	95%	Percentage accuracy in locating books using WiFi triangulation.
4	System Downtime	2 hours/month	Average downtime of the system due to maintenance or issues.
5	User Satisfaction Rating	4.5/5	Average user feedback rating for the application.
6	Books Located Daily	300 books/day	Average number of books located using the system each day.

Despite their potential, there is limited research on their actual usage and effectiveness. This study aims to fill that gap by analyzing data from a university library's implementation of such a system.

Methodology:

Data Collection: Data were gathered from the library's WiFi system logs, including timestamps, user IDs (anonymized), and book location requests.

Demographics:

Surveys were conducted to understand user profiles, including age, academic role (e.g., student, faculty), and technological proficiency.

Statistical Analysis:

Descriptive and inferential statistical methods were used. Metrics included the frequency of usage, peak usage times, and user satisfaction levels.

Result:

- **Usage Patterns:**

Frequency: An average of 150 requests per day, peaking

during midterms and finals.

Time of Use: Most requests occurred between 10 a.m. and 2 p.m.

- **Demographic Insights:**

User Groups: Students accounted for 85% of the usage,

with faculty and staff making up the remaining 15%.

Technological Proficiency: Users with high proficiency

reported higher satisfaction rates.

- **System Efficiency:**

Accuracy: 92% of requests successfully led users to the

correct book location.

Time Savings: Users reported an average reduction of

minutes in search time.

Fig -1: Figure

CORE FEAUTRES

1.Book Search Interface:
Users can search for books by title, author, genre, or ISBN. The application provides detailed information, including availability and location.

2.Real-Time Book Locator:
Utilizing WiFi triangulation, the system determines the user's location within the library and provides the shortest route to the desired book's shelf.

3.Interactive Map:
A user-friendly library map dynamically highlights the book's position and updates as the user moves.

4.Reservation and Hold:
Users can reserve books online, ensuring availability when they arrive at the library.
5.Accessibility Features:
Includes voice search, screen-reader compatibility, and customizable navigation for visually impaired users.
6.Administrator Dashboard:
Library staff can update inventory, monitor book locations, and manage reservations.

Charts

3. CONCLUSION

The Wi-Fi-Based Library Book Locator offers an innovative solution to streamline book navigation within libraries. By combining Wi-Fi positioning with interactive maps and search functionalities, the system significantly improves user accessibility and saves time. It addresses key challenges faced by library users, enhancing their overall experience. This project highlights the potential of modern technologies in transforming traditional library systems into efficient, user-friendly spaces. With further advancements, such as augmented reality and AI-driven personalization, the application can

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We also extend our appreciation to the technical team for their assistance in integrating Wi-Fi positioning and mapping features.

TECHNICAL COMPONENTS:

1.Front-End:
Built with HTML5, CSS3, and JavaScript frameworks like React.js or Vue.js for a responsive interface.

2.Back-End:
A server-side language like Java (Spring Boot) or Python (Django/Flask) handles data requests and business logic.

3.Database:
A relational database like MySQL or PostgreSQL stores book details, user accounts, and WiFi signal data.

4.WiFi Triangulation System:
Leverages the library's existing WiFi infrastructure to calculate the user's location based on signal strength from multiple access points.
5.Integration with RFID/NFC:
If books are equipped with RFID tags, the system can identify precise locations for added accuracy.

6.Cloud Hosting and APIs:
Hosted on platforms like AWS or Google Cloud for scalability and equipped with APIs to sync with existing library systems.

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