SMART LIBRARY SYSTEM

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Abstract: Traditional Library -Digital resources have increased the efficiency of managing a library; however, books are still impossible to find in physical libraries. This paper presents the design of a new smart library system that uses Light Emitting Diodes (LED) for accurate book tracking and positioning Touch Listener Circuits. The system is supported by a network of LED-based markers tiling the library, assisting users in real-time navigation accurately. An individual LED beacon is attached to each book, allowing it to communicate with a central control unit that can locate where the e-book resides. The system can be operated with a mobile application or interactive kiosks, wherein owners just get visual and directional cues to find their books faster. By significantly reducing the time it takes for a user to find an item within a library, this LED-based approach is not only improving navigation through physical collections but also making libraries easier and more efficient places to work.

I. INTRODUCTION

With a rich and historic tradition in sharing knowledge, libraries have been around for centuries providing the general public access to an extensive range of books and information. Nevertheless, even with the development of everything digital finding your way through a maze of bookshelves is still proving to be quite complex. With traditional forms of book recovery, users have to require a lot of time and definitely must use man power for browsing through the inventory because it is done manually every other day.

Abstract To solve these challenges, this paper presents a novel technique for Library books tracking by using Light Emitting Diodes (LEDs) in libraries. In the proposed smart library system, LED technology is adopted to generate a dynamic navigation aid for guiding users in real time within libraries. The system works by embedding LED markers in the library and labeling each semesters with individualized LED beacons, allowing for highly accurate location tracking as well as user assistance.

It is the same fundamental mindset as earlier but using visibility and controllability with LEDs to improve UX (User Experience) more than any library operation. Simply follow the LED to see where your favourite books are, meaning you spend less time searching for items. The system also helps to manage inventory efficiently and reduce the requirement for manual stock checks.

II. LITERATURE PAPER

[1] Ramji P. M, Shunbaga Pradeepa T The Task of this Project - Book Tracking System In Library Using RFID Technology Plat Form : This system used to monitor Books in Library via RFID module as well mobile. The primary one of improving library management, somewhere below that to enhancing the customer service.

[2] Sanmati Jinendran Jain, Prashanta Kumar Behera This paper expands user-centric and creates a dynamic environment that combines physical and digital resources. Libraries should modernize their systems to use things such as AI, machine learning and interactive interfaces for a better user experience and quicker information access.

[3] Ms. Ekta G. Thakre, Mr. Roshan S. Mokati. This paper looks at how are they attempting to create more dynamic, user centric environments where the aspects of physical and digital regimes can be enlisted together. The experience of users must be augmented and information access should be made more seamless through innovative technologies like AI machine learning, interactive interfaces etc.
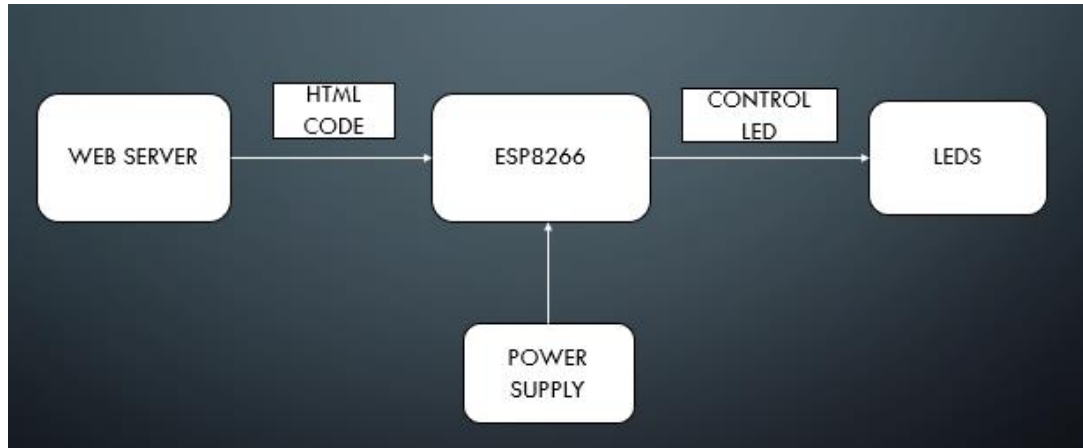
III. METHODOLOGY

A. BLOCK DIAGRAM

Figure 1: Here in data block the system block for ES8266 micro controller circuits has to be designed, that called as a web server. A web server which the HTML page, in order to provide a user interface for control LEDs. The action occurs as soon as the user interacts by means of web server, and sends HTML code containing LED control commands to be performed.

The ESP8266, connected to both the webserver and LEDs, handles these commands The input is compared with the sketch, and signals are sent to the LEDs telling them which ones should be on or off, what color they should have or at any intensity. The ESP8266 is off a power supply for energy and gives you all the electricity needed to work an important LED. This setup allows for remote control of the LEDs through a web-based interface.

B. WORKING

An Intelligent library system that uses LEDs for finding books This process starts by booting a Wifi connection, which is mandatory to provide seamless communication between the server of the Library and whisperer device. The user is presented with an intuitive interface, usually in the form of a web or mobile application that provides him/her holistic information about his department and semester to filter out only those permits are relevant.

This choice makes the search query more precise and locates it right to that portion of library. After this, the system asks in real-time database if that book is available for lending. This is a quite accurate database, in which every book has been registered and describes the location of each as well. If the book is not available, the system promptly displays a message informing the user of its unavailability, and may offer alternative options such as reservations or notifications for when the book becomes available.

C. FLOWCHART

Figure 2: Smart Library System For Book Location Wi Fi Network connect : In the first step, the system begins by initializing a Wi Fi connection. Then the user selects Department and Semester of a student as shown in below.

The book is verified by the system in two steps. If the book is not found, it will say that this specific isn't available. The rack LED is turned on at the respective location, when book inventory available so that user be guided to that book. Finally, the process stops.
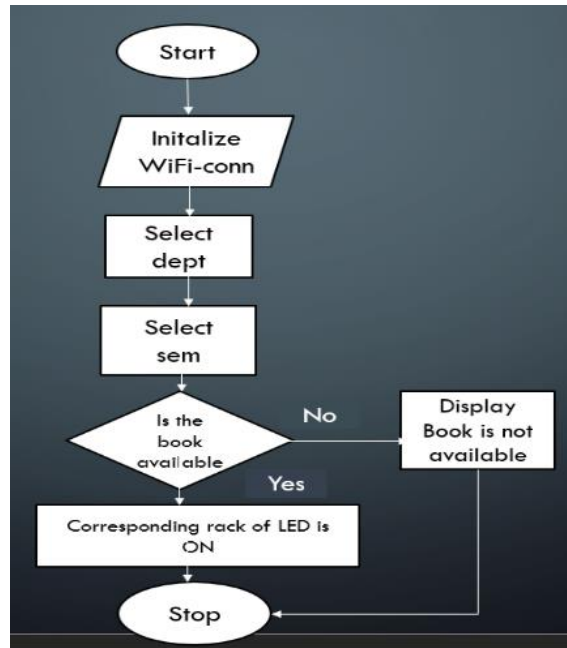
IV. RESULTS

The prototype of the proposed system is shown in Figure 3.

Case 1: In this scenario, the ESP8266 system powers on, connects to the Wi-Fi network, and hosts the web server, but no interaction occurs from the web interface. As a result, the server remains idle, waiting for any HTTP requests. The HTML page is accessible, displaying all book buttons with books 9 and 10 disabled. Since no input is received, all connected LEDs stay off, indicating that no book selection has been made. This scenario demonstrates the system's readiness and efficient idle state, consuming minimal resources until user interaction.

Case 2: , The user selects a book from ECE Semester 1 on the web interface. The ESP8266 server processes the request, turning on the corresponding LED for 2 seconds. This demonstrates the system's capability to respond accurately to user inputs and control hardware based on the selectedoptions.

Case 3: In this scenario, the user interacts with the ESP8266 system by selecting a book from the ECE department's Semester 3 via the web interface. Here's a detailed breakdown of the process and the system's response.

V.   APPLICATIONS

Large warehouses suffer from being unable to locate objects in a timely manner due to bad warehouse inventory management This system may one day be used to aid warehouse staff (literally lights up the section/shelf where an item is by lighting it up).

Smart Home Applications:
Room Locator - This would allow people to find anything in the house, keys or remote controls as an example (you press a button on colour ereader and it lights up an LED lightbulb above that room so like "MY KEYS ARE IN THE KICHEN")
Mood Lighting - Where LEDs light up the room and change based on time of day, environmental input or user setting.

Healthcare Facilities:
LED-based patient room status: LEDs can show what the state of a bed is (e.g. occupied, clean needed, ready for next...)
Finding Medical Equipment in the Hospital.

Transportation Hubs:
Baggage Claim Assistance: LEDs are used in airports to signal passengers the carousel where baggage from a particular flight can be expected, which helps avoid confusion Toggle/CPL Detection

Queue Management - At a train station or bus terminal, LEDs can be used to inform passengers of which service is next and cues.

Educational Institutions:
Classroom and Lab Equipment: Assist students and staff to find a specific classroom resources or laboratory equipment.
Library Book Returns: Pointing out where to return books OR shading past due items.

REFERENCES

[1]. Ramji P. M, Shunbaga Pradeepa T. "The Task of this Project - Book Tracking System In Library Using RFID Technology."
[2]. Sanmati Jinendran Jain, Prashanta Kumar Behera. "This paper expands user-centric and creates a dynamic environment that combines physical and digital resources.
[3]. Ms. Ekta G. Thakre, Mr. Roshan S. Mokati. "This paper looks at how they are attempting to create more dynamic, user-centric environments where the aspects of physical and digital regimes can be enlisted together