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# 6<sup>th</sup> International Innovation & Design in Library & Information Science Competition (InDeLib2023)



## MAPPING THE LIBRARY OF TOMORROW THROUGH INNOVATION

### Editors

Asmadi Mohammed Ghazali  
Abd Latif Abdul Rahman  
Zuraidah Arif  
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Dewan Perdana,  
UiTM Kedah

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## PREFACE

The first International Innovation & Design in Library & Information Science Competition (InDeLib) was held in 2016 at the international level. InDeLib became a brand name linked to the Faculty of Information Management, UiTM Kedah Branch, known to many local and international learning institutions. InDeLib is open to all organizations (libraries), librarians, professionals, researchers, academicians, teachers, and students from institutes of higher learning, college, secondary and primary schools. They share their ideas or methods throughout innovation and invention, particularly in library and information science. The 6<sup>th</sup> InDeLib 2023 is endorsed by the Librarians Association of Malaysia and the National Library of Malaysia.



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# ARDUINO-POWERED REAL-TIME LIBRARY SEATING AVAILABILITY SYSTEM

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## Abstract

The challenge of locating available study seats in contemporary libraries is exacerbated by limited seating and an unfamiliar layout, especially in large, multi-story libraries. This issue is particularly pronounced during examination periods when libraries are densely populated, making it difficult for students and visitors to find suitable study spaces efficiently. To address this problem, we propose a Library Seat Availability Live Monitoring System using Arduino technology. Our system integrates an Arduino UNO, infrared (IR) sensors, and an LCD to create a real-time monitoring mechanism for seat availability. The IR sensors adeptly detect motion and body heat within the seating area, transmitting signals to the Arduino UNO, which processes the data and presents the count of available seats on an LCD screen. This strategic deployment of sensor networks enables users to swiftly identify unoccupied study spots, eliminating the need for extensive exploration within the library. The lab-scale prototype of our system will be evaluated for its accuracy and time efficiency in detecting available seats. The results will provide insights into the feasibility and practicality of implementing such a solution on a larger scale within library environments. Furthermore, this work sets the foundation for future enhancements, including developing web and mobile apps. These applications could allow users to navigate the library layout, identify available seats, and reserve online study spots. By integrating technology into the library experience, we aim to streamline the process of finding and securing study spaces, saving visitors valuable time and enhancing the overall efficiency of library resource utilization.

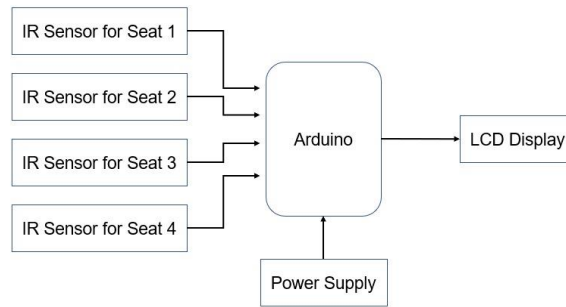
## Keywords

Library Seat Availability, Live Monitoring System, Arduino Technology, Internet of Things (IoT)

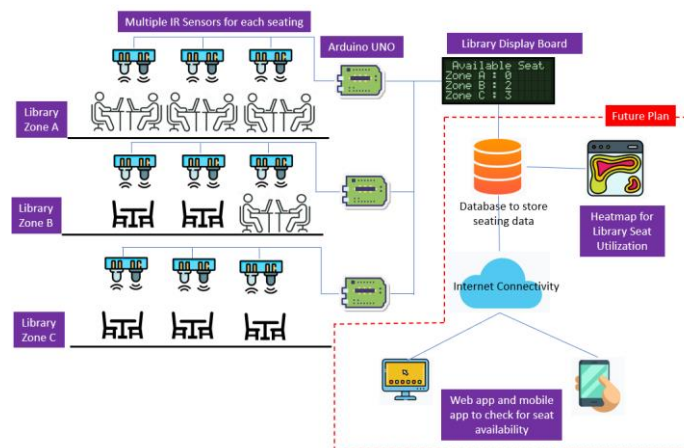
## Product Description

The system proposed is to be used in the conventional library. A controller with sensors and a display board will be added to the library. For this project, we tested on a lab-scale prototyped library. The controller used is an Arduino Uno, the sensor used is an IR sensor, and an LCD and LEDs are used to display the feedback. The Arduino will control the input and output set in the code. When the IR sensor detects the presence of someone sitting on the seat, the sensor will send the information to the Arduino to update the display on the LCD that the seat is occupied and the number of available seats is decreased.

Figure 1 shows the system design process. When the IR Sensor senses heat or motion, it sends a signal to the Arduino to update the LCD to display whether the seat is available or occupied.



For the large scale of the library, Figure 2 below shows an architectural diagram of the library seating availability system.



### Novelty & Uniqueness

The proposed Arduino-Powered Real-Time Library Seating Availability System introduces a novel approach to addressing the challenges of finding study spaces in contemporary libraries. Its uniqueness lies in integrating dual infrared (IR) sensors for motion detection and body heat sensors for occupancy identification. This dual-sensor precision sets the system apart, providing a nuanced and accurate means of distinguishing between actual seat occupancy and transient movements. Real-time monitoring, facilitated by Arduino technology, ensures prompt updates on an LCD, offering users up-to-the-minute information and a dynamic solution to the everyday struggle of locating study spaces. The strategic deployment of sensor networks within the library demonstrates a forward-thinking approach, alleviating layout challenges in large, multi-story libraries. Planned enhancements, such as the development of web and mobile apps, showcase a commitment to a comprehensive user experience, enabling navigation, seat identification, and online reservations.

### Benefits to Mankind

This proposed system will enhance the user experience. Visitors who visit the library can monitor the available seats at the front door before looking around for an empty seat. This project also shows the streamlined process of finding and securing study spaces. Furthermore, the proposed project will also contribute to the efficient use of library resources. This project will ultimately benefit both library visitors and society as a whole.

### Potential Commercialization

The proposed Library Seat Availability Live Monitoring System, utilizing Arduino technology, holds significant potential for commercialization within the library and education sectors. This system integrates Arduino UNO, infrared sensors, and an LCD to create a real-time monitoring mechanism for seat availability. Possible commercial avenues include

- selling the system to libraries and educational institutions,

- offering technology integration and customization services,
- provide data analytics and reporting tools, and
- developing subscription-based web and mobile applications.

The underlying technology may also find applications in other public spaces. The potential for patenting, licensing, and offering training and support services adds additional layers to its commercial viability.

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