



اُنْدُوْسِيْتِي تِكْنُوْلُوْجِي مَارَا  
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**MEC 300**

**DEVELOPMENT OF ROBOTIC ARM SYSTEM  
REPLICA FOR ARRANGING BOOKS IN LIBRARY**

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## ABSTRACT

Books arrangement and organizing is a fundamental works in places like library when there are hundreds of it to be handled with. Doing it manually can lead to an error such as misplacement, uneven spacing and other issues. To overcome this problem, this study goal is to develop a replica of robotic mechanical arm system to help arranging books in more efficient way. By using a model by Arduino, the study focus will be to design a system that can transport books from location 1 to location 2. A few experiments will be conducted to measure its effectiveness on arranging books and to measure the system's limits. The success of this project will make things easier for librarians specifically and maybe other fields that involving with books such as bookstores.

# Chapter 1

## Introduction

### 1.1 Background Study

Books exist in a lot of sizes, some can be thick, some may be thin. Storing and arranging them has been a work in library for a long time. Arranging books in a library is a vital task that ensures the efficient organization and accessibility of the library's collection. An organized book arrangement system facilitates easy retrieval of materials for library users, enhances the user experience, and optimizes the overall functionality of the library.

In a library, the arrangement of books plays a crucial role in ensuring easy access and efficient utilization of resources. Traditional methods of book arrangement involve categorizing books based on classification systems such as the Dewey Decimal Classification (DDC) or the Library of Congress Classification (LCC). These systems organize books into logical categories and assign call numbers to facilitate their location on shelves. However, the manual process of arranging books can be time-consuming, labor-intensive, and prone to errors.

The development of a robotic arm system replica offers an innovative solution to overcome the challenges associated with manual book arrangement in a library. A robotic arm is an articulated machine capable of mimicking the movements of a human arm, providing precision and versatility in handling objects. By integrating a robotic arm replica into the book arrangement process, several benefits can be achieved.

The robotic arm system replica can swiftly sort books based on predefined criteria, such as alphabetical order, numerical order, or subject categories. Its precise movements enable the arrangement of books in a systematic and error-free manner. Additionally, the robotic arm can analyze the available space on library shelves and arrange books accordingly, ensuring maximum utilization of storage capacity and enhancing the overall organization of the library collection.

Manual book arrangement often involves heavy lifting and repetitive motions, which can lead to physical strain and injuries for library staff. By automating the process with a robotic arm replica, the risk of physical harm is significantly reduced. The programming capabilities of the robotic arm replica allow for customization and adaptability to different library layouts and book arrangement preferences. It can be easily reprogrammed to accommodate changes in classification systems or library collection expansion.

## **Problem Statement**

Arranging books can be very tiring and takes a lot of times especially when there are dozens of its, there can also be mistakes where the person accidentally put the wrong books on the wrong category. Uneven arranging of books can cause substantial issues to the library and bookstores.

## **Objectives**

- 1.To build a robotic arm that capable of automatically moving books from fixed position.
- 2.To observe the difference in time between manual method and robotic arm.

## **Scope of work**

1. A mechanical robotic arm that runs on Arduino software.
2. Materials includes by Braccio (++) kit to assemble the arm replica
3. books with different dimensions such as 10x10 inches,5x5 inch and etc.
4. Experiment was conducted by observation and try and error method.

## **Summary**

Overall, the result obtained from this project will help achieving the objectives. This will be done by using the robotic arm powered by Arduino to do series of task arranging books on the shelf from fixed position.