

PROTOTYPE DESIGN COLLECTION

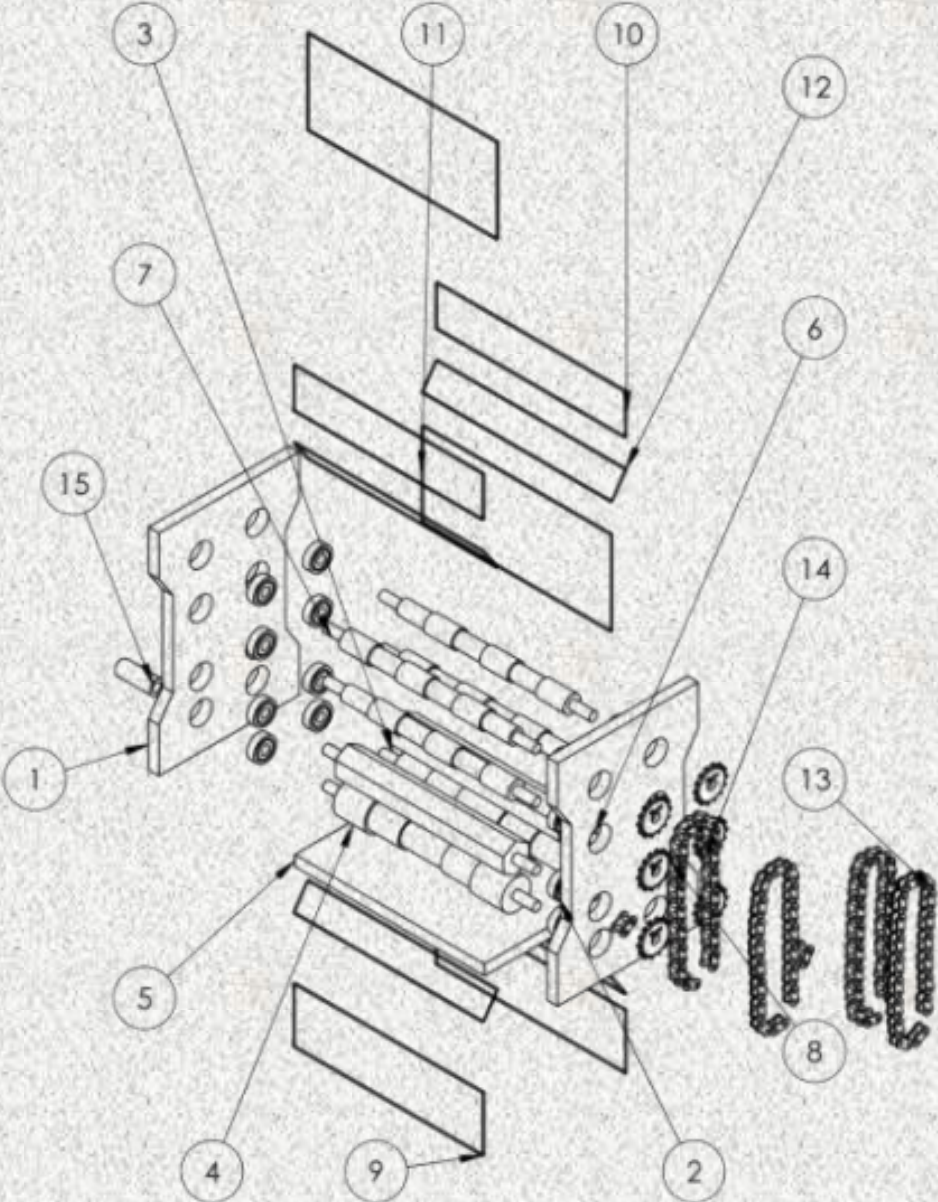
SERIES 4



Universiti Teknologi MARA
Pasir Gudang Campus

Prototype Design Collection

Series 4



Ahmad Najmie Rusli

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PUBLISHER:

Universiti Teknologi MARA
Cawangan Johor Kampus Pasir Gudang,
Jalan Purnama, Bandar Seri Alam, 81750 Masai, Johor
September 2025

eISBN: 978-967-0033-62-4

FOREWORD

This digital book on Prototype Design Collection Series 4 (PDC Series 4) is published as a reference design for mechanical engineering students. The designs presented experience a few phases of analysis before fabrication of prototype. Each project summarises the project description, prototype, figures, and design parameter. The design products vary in tools or equipment for household, workshop, entrepreneur, etc. Suggested material and detail of prototype dimension are also mentioned in this book.

It is hoped that this book will assist the students to have more ideas on innovation design products in the future.

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CHAPTER 21

Mini Robotic Arm for Educational Purpose

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PROJECT DESCRIPTION

The rapid advancements in robotics have increased the demand for hands-on educational tools that enhance students' understanding of automation, control systems, and programming. However, many existing robotic arms are either too expensive or too complex for beginners, limiting accessibility in educational settings. To address this issue, this project focuses on the design and fabrication of a mini robotic arm with six degrees of freedom (DOF) for educational purposes. The methodology involves the design of mechanical components, selection of appropriate servo motors, electronic circuit integration, and programming using Arduino IDE. The robotic arm is constructed from aluminum, ensuring durability while maintaining a lightweight structure. It is powered by servo motors for precise movement and is controlled via an Arduino microcontroller, making it an ideal platform for learning embedded systems and robotics programming. The system is operated using a 3-axis analog controller, providing an intuitive and user-friendly interface for students to manipulate the arm in real-time. The performance of the robotic arm is evaluated based on movement accuracy, response time, and ease of control. The results indicate that the mini robotic arm successfully performs basic pick-and-place operations with considerable articulation and precision. It provides an affordable and effective tool for students to explore robotics concepts, motion control, and automation techniques. Future improvements may include integrating sensors for enhanced functionality and expanding control options through wireless connectivity.

Keywords: *Robotic, Arm*

PROTOTYPE



DESIGN PARAMETER

