

# PROTOTYPE DESIGN COLLECTION

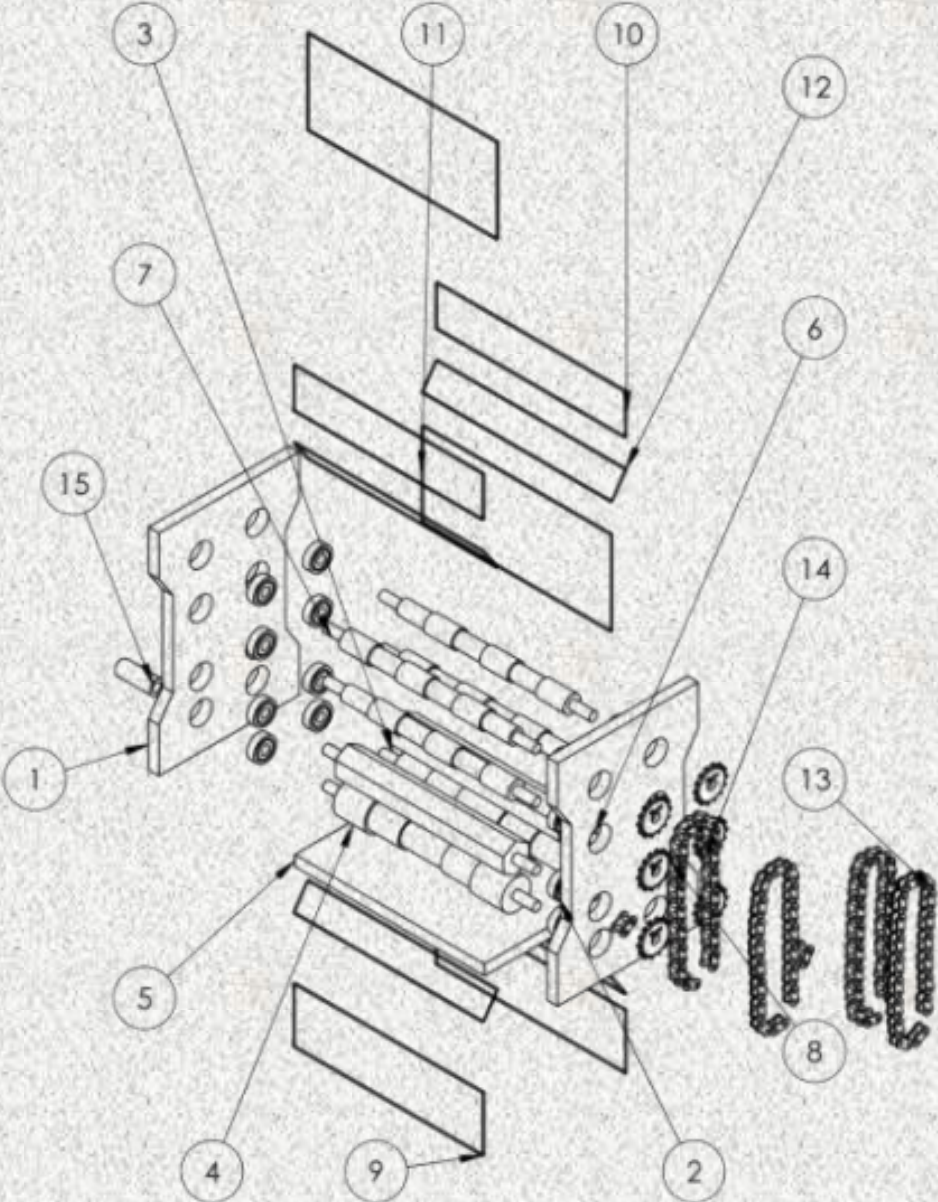
SERIES 4



Universiti Teknologi MARA  
Pasir Gudang Campus

# Prototype Design Collection

## Series 4



Ahmad Najmie Rusli

**Copyright © 2025 Universiti Teknologi MARA Cawangan Johor, Kampus Pasir Gudang,  
Jalan Purnama, Bandar Seri Alam, 81750 Masai Johor.**

All rights reserved. No part of this digital book may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the written permission of the Head of the Centre for Studies, Faculty of Mechanical Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus.

**CHIEF EDITOR:**

Ahmad Najmie Rusli

**EDITOR:**

Nurul Nadiyah Rasdi

**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.

## Table of Contents

|   |    |
|---|----|
| <b>CHAPTER 1</b> .....  | 1  |
| <b>Design and Fabrication of a Multipurpose Baby Cot</b> .....  | 1  |
| Nabil Qayyum Bin Roslan <sup>1</sup> and Miqdad Bin Khairulmaini <sup>2*</sup> .....  | 1  |
| <b>CHAPTER 2</b> .....  | 3  |
| <b>Design and Fabrication of a Weather Sensing Cloth Drying Rack</b> .....  | 3  |
| Mustaqim Syah Bin Kamarul Zaman <sup>1</sup> and Miqdad Bin Khairulmaini <sup>2*</sup> .....  | 3  |
| <b>CHAPTER 3</b> .....  | 5  |
| <b>Design and Fabrication of a Patient Transfer Aid for Seamless Bed to Wheelchair Mobility</b> ..  | 5  |
| Fateen Aqela Binti Azzaidi <sup>1</sup> and Miqdad Bin Khairulmaini <sup>2*</sup> .....   | 5  |
| <b>CHAPTER 4</b> .....  | 7  |
| <b>Prototype of a Donut Topping Machine</b> .....   | 7  |
| Nurul Athirah Binti Ramizan Nassir <sup>1</sup> and Ahmad Najmie Rusli <sup>2*</sup> .....  | 7  |
| <b>CHAPTER 5</b> .....  | 9  |
| <b>Prototype of a PLA Filament Extruder</b> .....   | 9  |
| Abdul Harith Hazim Bin Abd Rashid <sup>1</sup> and Ahmad Najmie Rusli <sup>2*</sup> .....   | 9  |
| <b>CHAPTER 6</b> .....  | 11 |
| <b>Prototype of a Candy Sorting Machine</b> .....   | 11 |
| Hairul Ikhwan Bin Hazizan <sup>1</sup> and Ahmad Najmie Rusli <sup>2*</sup> .....   | 11 |
| <b>CHAPTER 7</b> .....  | 13 |
| <b>Prototype of a 3D Printing Scrap Recycling Machine</b> .....   | 13 |
| Raziq Amir Bin Rosdi <sup>1</sup> and Ahmad Najmie Rusli <sup>2*</sup> .....  | 13 |
| <b>CHAPTER 8</b> .....  | 15 |
| <b>Manual Compaction Machine for Casting</b> .....  | 15 |
| Muhammad Hazim Md Azli <sup>1</sup> , Najibah Ab Latif <sup>2*</sup> and Ainaa Maya Munira Ismail <sup>3</sup> .....                      | 15 |
| <b>CHAPTER 9</b> .....  | 17 |
| <b>Convertible Cart-Ladder</b> .....  | 17 |
| Mohamad Aimi Zuhairi Fikri Mohd Aimi Zamani <sup>1</sup> , Najibah Ab Latif <sup>2*</sup> and Ainaa Maya Munira Ismail <sup>3</sup> ..... | 17 |
| <b>CHAPTER 10</b> .....   | 19 |
| <b>Design and Fabrication of Mini Firefighting Device</b> .....   | 19 |
| Adam Faris Bin Ahmad Zaidy <sup>1</sup> and Muhamad Faris Syafiq Bin Khalid <sup>2*</sup> .....   | 19 |
| <b>CHAPTER 11</b> .....   | 21 |
| <b>Design and Fabrication of Shuttlecock Launcher Machine</b> .....   | 21 |

## CHAPTER 53

### Design and Fabrication of Suspension System for Formula Racing Car

Muhammad Faiz Najwan Bin Tajul Ariffin <sup>1</sup> and Hazim Sharudin <sup>2\*</sup>

<sup>1,2</sup>*Faculty of Mechanical Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*

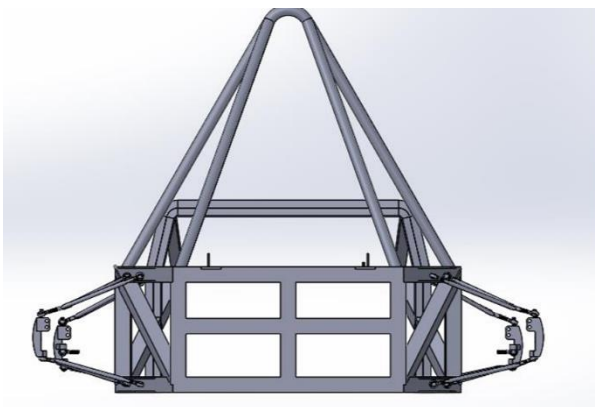
*\*Corresponding author (e-mail): hazim@uitm.edu.my*

#### PROJECT DESCRIPTION

Suspension is generally used for the vehicle to support the vehicle body and increase ride comfort. The suspension system also prevents road disturbances that affect passenger comfort while increasing riding capabilities and performing a smooth driving experience. Most suspension has a problem with power transfer that affects the driving experience for the driver for certain road surface quality when cornering or when handling the vehicle. Due to the quality of suspension, many vehicles have gone into an accident, for example, lost control when performing the driving experience. This project is conducted to give more driving comfort to the driver when performing a drive on any type of road obstacle like sharp corners, up and downhill roads, slippery roads, and so on. The project is also to retain stability and give smooth driving experience using the ride material or best quality for vehicles and can handle certain loads like body frame, body kit, engine system, driver's load, and other loads that are related. For the method, the suspension system will be set up using the correct ways like the angle of the suspension, and the right place to put the suspension so it will not give any major problems when handling the vehicle.

**Keywords:** *Formula race car, Suspension System*

#### PROTOTYPE



### DESIGN PARAMETER

