

# PROTOTYPE DESIGN COLLECTION

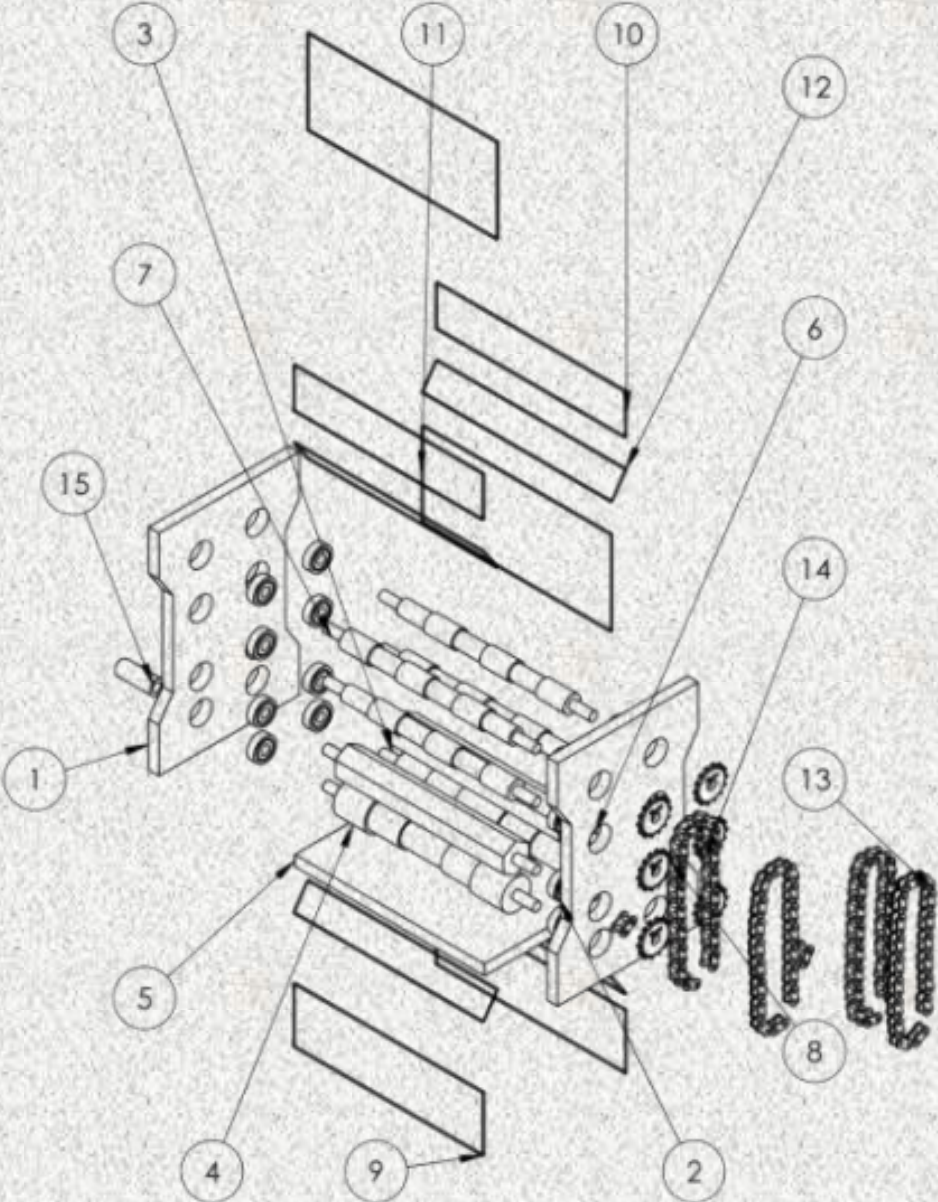
SERIES 4



Universiti Teknologi MARA  
Pasir Gudang Campus

# Prototype Design Collection

## Series 4



Ahmad Najmie Rusli

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# 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 44

### Wind Electric Generator

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#### PROJECT DESCRIPTION

The Wind Electric Generator project aims to develop a compact and efficient renewable energy solution by harnessing wind power for electricity generation. Given the growing demand for sustainable energy sources, this study focuses on optimizing wind turbine design for enhanced performance, cost-effectiveness, and adaptability to various environmental conditions. The primary objective is to design, fabricate, and test a wind electric generator that can operate efficiently even at low wind speeds, making it suitable for small-scale applications. The methodology involves computational modeling using SolidWorks to simulate turbine aerodynamics, followed by material selection and prototype fabrication. A pulley system is integrated to optimize energy transfer from the rotating blades to a DC generator, which then charges a battery for power storage. Experimental testing evaluates power output, structural stability, and operational efficiency under different wind conditions. Preliminary results demonstrate that the optimized design enhances energy capture efficiency while maintaining low production costs. The prototype successfully generates electricity with minimal mechanical resistance, making it a viable alternative for off-grid applications. However, challenges such as wind variability and mechanical wear require further refinements.

**Keywords:** *Wind Turbine, Renewable Energy*

#### PROTOTYPE



**DESIGN PARAMETER**

EM NO.	PART NUMBER	QTY.
1	Circle Plate	1
2	Bottom body	1
3	Upper body	1
4	Gearbox final	1
5	Rod at gearbox	1
6	Gearbox cover	1
7	Hexagon head	1
8	New Blades	1
9	Pole	1
10	Rod top	1
11	Turbine holder	1

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