

PROTOTYPE DESIGN COLLECTION

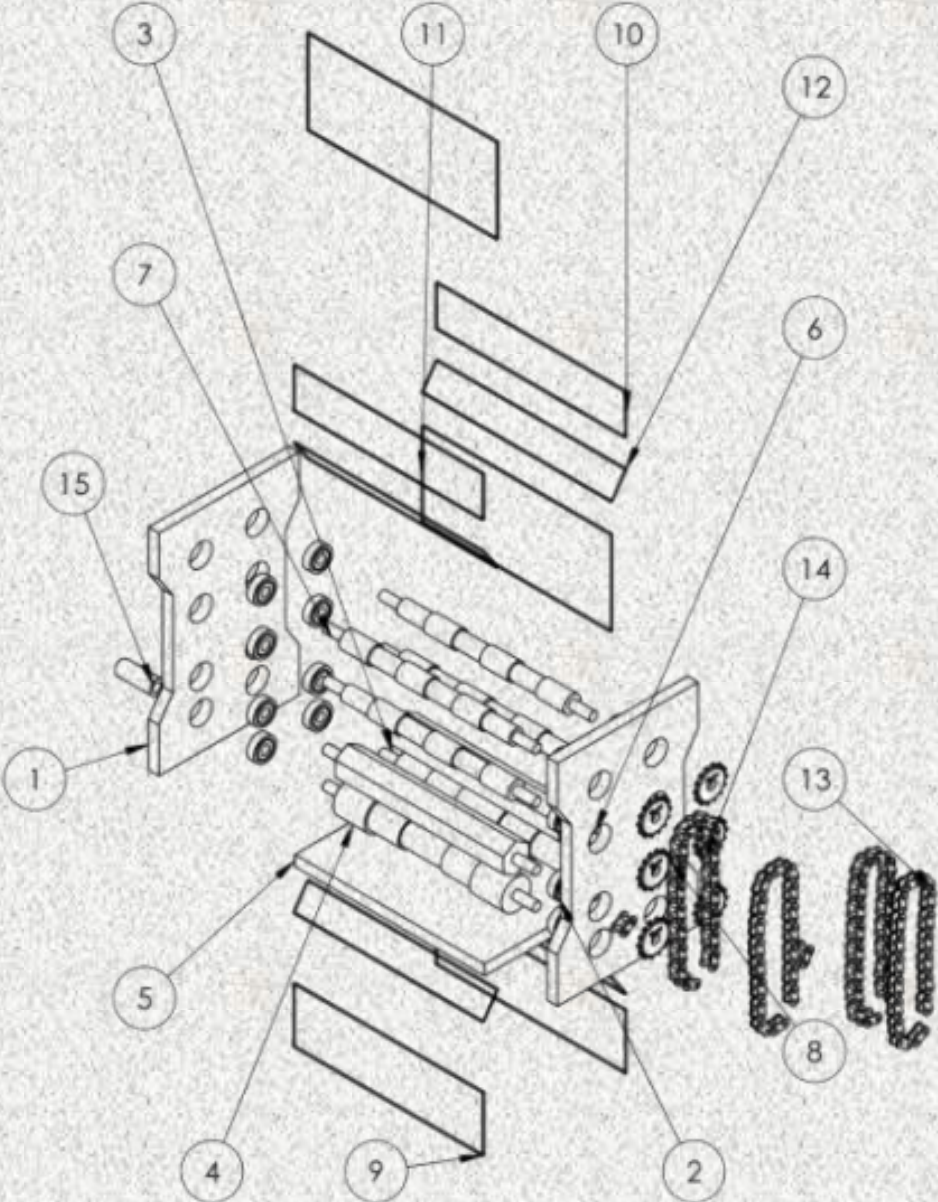
SERIES 4



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

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

CHAPTER 42

Umbrella Dryer Machine

Ain Nur Mawaddah Binti Mohd Reduan ¹ and Haszeme Bin Abu Kasim ^{2*}

^{1,2}*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): haszeme9720@uitm.edu.my*

PROJECT DESCRIPTION

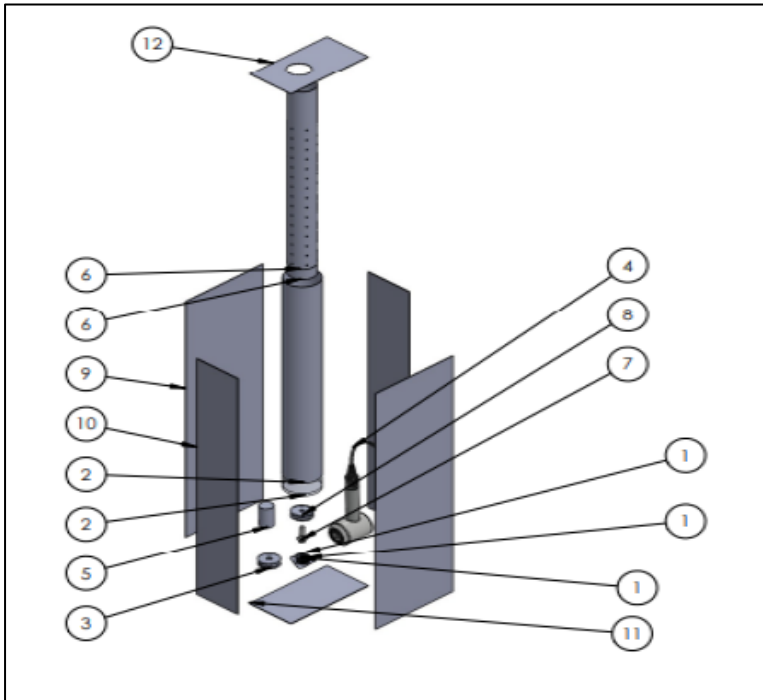
The Umbrella Dryer Machine is designed to address the inconvenience and safety hazards associated with wet umbrellas in indoor spaces. Wet umbrellas contribute to slippery floors, increased maintenance, and potential theft risks when left unattended. This project aims to develop an efficient, compact, and user-friendly solution for drying umbrellas quickly, enhancing cleanliness and safety in public and private facilities. The project involves the design, fabrication, and evaluation of a prototype that integrates centrifugal drying and controlled heating mechanisms. The methodology includes computational design using SolidWorks, material selection for durability, and experimental validation to assess drying efficiency and safety compliance. The system operates by spinning the umbrella at high speeds to remove excess water, combined with a controlled heating element to accelerate the drying process while ensuring user safety. Performance testing demonstrates that the prototype significantly reduces drying time compared to conventional methods while preventing water spillage. The system effectively minimizes maintenance costs for building facilities and enhances user convenience. Future improvements include incorporating automatic sensors for user detection, optimizing energy efficiency, and refining airflow mechanisms to accommodate various umbrella sizes.

Keywords: *Umbrella Drye, Indoor Safety*

PROTOTYPE



DESIGN PARAMETER



ITEM NO.	PART NUMBER	QTY.
1	assem blower	1
2	Assom INNER OUTER	1
3	bearing + conveyor	1
4	hair dryer	1
5	motor	1
6	Assem PVC INNER	1
7	M12-1.75 x 45	1
8	bearing + conveyor 1	1
9	aluminium profile 300mm width x 935mm length	2
10	aluminium profile 160mm width x 935mm length	2
11	Aluminium 160mm x 300mm length	1
12	top Aluminium 160mm x 300mm length	1

NAME: AIN NUR MAWADDAH
STUDENT ID: 2022828932
CLASS : J4CEEM1104C
PART NAME : EXPLODED VIEW UMBRELLA DRYING MACHINE
SCALE : 1:2 SHEET 1 OF 1