

# PROTOTYPE DESIGN COLLECTION

## SERIES 2



# Prototype Design Collection

## Series 2



**AHMAD NAJMIE RUSLI**

**UNIVERSITI TEKNOLOGI MARA CAWANGAN JOHOR  
KAMPUS PASIR GUDANG**

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# FOREWORD

This digital book on Prototype Design Collection Series 2 (PDC Series 2) 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 26

### Designed, Analyzed and Fabricated of Mechanical Trolley Stair Climber

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#### PROJECT DESCRIPTION

A hand trolley is a compact, versatile tool designed for transporting heavy objects from one location to another. Commonly used across various industries dealing with physical goods, hand trolleys can have limitations when it comes to moving large items like furniture or household appliances, particularly in apartments or houses with staircases. This challenge is further compounded for individuals with disabilities or those who rely on wheelchairs for mobility. While electric stair-climbing trolleys exist, their complex mechanisms and additional electrical components, such as motors and batteries, drive up the cost of these devices. As a result, they can be prohibitively expensive for lower-income individuals. To address this issue, the Mechanical Trolley Stair Climber has been developed as an affordable alternative. The primary objective of this project is to design, analyze, and fabricate a trolley stair climber capable of lifting and carrying various types of loads, including accommodating individuals in wheelchairs. This product was designed and analyzed using SolidWorks software, with mild steel, Tri-Star wheels, and bearings selected as the main materials. The fabrication process involved welding, cutting, and grinding. In conclusion, this product has been successfully designed, analyzed, and fabricated. This innovative product has the potential to benefit both lower-income groups and people with disabilities by offering a more affordable and accessible solution for navigating stairs.

**Keywords:** *Hand trolley, Mechanical trolley*

#### PROTOTYPE



**DESIGN PARAMETER**

