

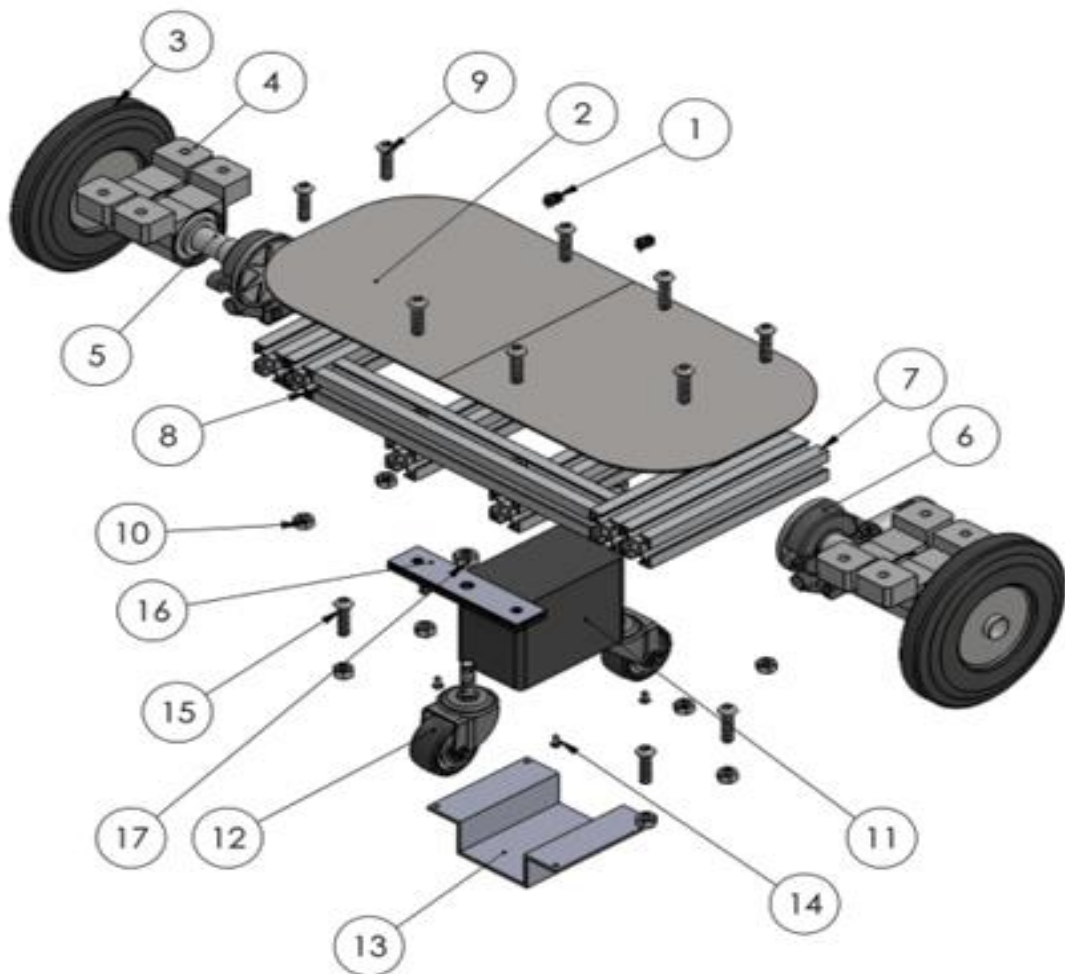
# PROTOTYPE DESIGN COLLECTION

## SERIES 2



# Prototype Design Collection

Series 2



AHMAD NAJMIE RUSLI

UNIVERSITI TEKNOLOGI MARA CAWANGAN JOHOR  
KAMPUS PASIR GUDANG

**Copyright © 2023 Prototype Design Collection Series 2.**

All right 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 written permission from the Head of Centre of Mechanical Engineering Studies, (Pusat Pengajian Kejuruteraan Mekanikal), College of Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus.

**e-ISBN NO 978-967-0033-18-1**

First published, 29<sup>th</sup> September 2023

**CHIEF EDITOR:**

Ahmad Najmie Rusli

**CONTENT EDITORS:**

Ahmad Faidzal Khodori

Hazriel Faizal Pahroraji

Norhisyam Jenal

Nurrul Amilin Zainal Abidin

Nurulnatisya Ahmad

Radzi Abdul Rasih

**PUBLISHED BY:**

Universiti Teknologi MARA Cawangan Johor,

Kampus Pasir Gudang,

Jalan Purnama, Bandar Seri Alam,

81750 Masai,

Johor Darul Ta'zim.

Tel: +60 7-381 8493

# 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.

## Table of Contents

<b>CHAPTER 1</b> .....	1
<b>An Improvement of Storage Space and Drying Using Shoe Dryer Cabinet</b> .....	1
Muhammad Arif Imran Bin Iskandar <sup>1</sup> and Miqdad Bin Khairulmaini <sup>2*</sup> .....	1
<b>CHAPTER 2</b> .....	3
<b>Portable Wrapping Machine</b> .....	3
Muhammad Hakim Bin Hisam <sup>1</sup> and Miqdad Bin Khairulmaini <sup>2*</sup> .....	3
<b>CHAPTER 3</b> .....	5
<b>Design and Fabrication of Innovative Egg Breaker and Egg Yolk Separator Machine</b> .....	5
Muhammad Fathurrahman Bin Muizuddin <sup>1</sup> and Miqdad Bin Khairulmaini <sup>2*</sup> .....	5
<b>CHAPTER 4</b> .....	7
<b>Development of Innovative Portable Washing Machine</b> .....	7
Anna Jasmine Binti Hariulnizam <sup>1</sup> and Miqdad Bin Khairulmaini <sup>2*</sup> .....	7
<b>CHAPTER 5</b> .....	9
<b>Development of a Prototype Mechanically Moveable and Height-Adjustable Ladder</b> .....	9
Muhammad Aiman Bin Mat Nawi <sup>1</sup> and Miqdad Bin Khairulmaini <sup>2*</sup> .....	9
<b>CHAPTER 6</b> .....	11
<b>Design and Fabrication of Mechanical Floor Cleaner</b> .....	11
Muhamad Arif Bin Jailan <sup>1</sup> and Miqdad Bin Khairulmaini <sup>2*</sup> .....	11
<b>CHAPTER 7</b> .....	13
<b>Design and Fabricate of Portable and Multifunction Shoe Rack</b> .....	13
Farez Azra'e Bin Arman <sup>1</sup> and Radzi Abdul Rasih <sup>2*</sup> .....	13
<b>CHAPTER 8</b> .....	15
<b>Food Manual Grinder</b> .....	15
Nur Izzah Putri Binti Shamsul Niza <sup>1</sup> and Ab Aziz Mohd Yusof <sup>2*</sup> .....	15
<b>CHAPTER 9</b> .....	17
<b>Design, Analysis and Fabrication of Loose Oil Palm Fruit Picker</b> .....	17
Ahmad Amin Zakwan Bin Abu Mawan <sup>1</sup> and Norjasween Abdul Malik <sup>2*</sup> .....	17
<b>CHAPTER 10</b> .....	19
<b>Development Of a Prototype Automatic Sauce Dispenser</b> .....	19
Asif Muhaimin Mohd Saiful Nizam <sup>1</sup> and Norjasween Abdul Malik <sup>2*</sup> .....	19
<b>CHAPTER 11</b> .....	21
<b>Design, Analysis and Fabrication of Dustbin 5R</b> .....	21
Faiqah Nadhirah Binti Zaizul Jifri <sup>1</sup> and Norjasween Abdul Malik <sup>2*</sup> .....	21

<b>CHAPTER 12</b> .....	23
<b>Design, Fabrication and Analysis of Apam Balik Cooker</b> .....	23
Muhammad Afiq Danial bin Ramlee <sup>1</sup> and Hazriel Faizal bin Pahroraji <sup>2*</sup> .....	23
<b>CHAPTER 13</b> .....	25
<b>Design, Fabricate and Analysis of Semi Auto Tart Printer Machines</b> .....	25
Muhammad Haziq bin Md Fauzi <sup>1</sup> and Hazriel Faizal bin Pahroraji <sup>2*</sup> .....	25
<b>CHAPTER 14</b> .....	27
<b>Fish Scaling Machines</b> .....	27
Adam bin Habri <sup>1</sup> and Haszeme bin Abu Kasim <sup>2*</sup> .....	27
<b>CHAPTER 15</b> .....	29
<b>Yard Cleaner</b> .....	29
Aiman Haziq bin Ahmad Hashni <sup>1</sup> and Haszeme bin Abu Kasim <sup>2*</sup> .....	29
<b>CHAPTER 16</b> .....	31
<b>Advanced Food Folder Machine</b> .....	31
Alya binti Amenudden <sup>1</sup> and Haszeme bin Abu Kasim <sup>2*</sup> .....	31
<b>CHAPTER 17</b> .....	33
<b>The Oil Palm Loose Fruit Collector Machine</b> .....	33
Zulhusni Bin Samsor <sup>1</sup> and Haszeme bin Abu Kasim <sup>2*</sup> .....	33
<b>CHAPTER 18</b> .....	35
<b>An Automatic Rempeyek Machine</b> .....	35
Siti Nur Aina Khadijah binti Mohd Noh <sup>1</sup> and Siti Khadijah binti Alias <sup>2*</sup> .....	35
<b>CHAPTER 19</b> .....	37
<b>Safety Cooking Gas Trolley</b> .....	37
Hazim Aizzuddin bin Azizzan <sup>1</sup> and Ahmad Faizal bin Khodori <sup>2*</sup> .....	37
<b>CHAPTER 20</b> .....	39
<b>Waste Compactor Trash Can</b> .....	39
Wan Syafiq Nadzmie bin Wan Suhaimi <sup>1</sup> and Ahmad Faizal bin Khodori <sup>2*</sup> .....	39
<b>CHAPTER 21</b> .....	41
<b>Hydrogen Flame Generator from Water</b> .....	41
Muhammad Hizami Bin Rahman <sup>1</sup> , Nurulnatisya Binti Ahmad <sup>2*</sup> and Muhammad Amir Bin Md Shah <sup>3</sup> .....	41
<b>CHAPTER 22</b> .....	43
<b>Semi-Automatic Collecting Load Trolley</b> .....	43
Muhammad Luqman Bin Mohd Suhardi <sup>1</sup> and Nurulnatisya Binti Ahmad <sup>2*</sup> .....	43
<b>CHAPTER 23</b> .....	45
<b>A Garden Storage Trolley with Dried Leaves &amp; Trash Collector</b> .....	45

Muhamad Hasan Mohd Juzaila <sup>1</sup> , Najibah Ab Latif <sup>2*</sup> and Ainaa Maya Munira Ismail <sup>3</sup> .....	45
<b>CHAPTER 24</b> .....	47
<b>Design and Fabrication of Shoe Rack with Dryer Function</b> .....	47
Mohamad Syafie Bin Zainal <sup>1</sup> , Nur Kamarliah Kamardin <sup>2*</sup> and Ahmad Idzwan Yusuf <sup>3</sup> .....	47
<b>CHAPTER 25</b> .....	49
<b>Dustbin Lid Pedal Lifter</b> .....	49
Luqman Haikal Bin Zulhelmi <sup>1</sup> , Nur Kamarliah Kamardin <sup>2*</sup> and Ahmad Idzwan Yusuf <sup>3</sup> .....	49
<b>CHAPTER 26</b> .....	51
<b>Designed, Analyzed and Fabricated of Mechanical Trolley Stair Climber</b> .....	51
Muhamad Husain bin Mohd Juzaila <sup>1</sup> , Nur Kamarliah Kamardin <sup>2*</sup> and Ahmad Idzwan Yusuf <sup>3</sup> ...	51
<b>CHAPTER 27</b> .....	53
<b>Design and Fabrication of Crushing Machine</b> .....	53
Mohamad Amirul Afieq Danial Bin Azlan <sup>1</sup> and Ahmad Najmie Rusli <sup>2*</sup> .....	53
<b>CHAPTER 28</b> .....	55
<b>Design, Analysis and Fabrication Coconut Flakes Scrapping Machine</b> .....	55
Amir Aziq Ab Hamid <sup>1</sup> and Ahmad Najmie Rusli <sup>2*</sup> .....	55
<b>CHAPTER 29</b> .....	57
<b>Hand Operated Can Crusher</b> .....	57
Muhammad Ammar bin Che Suffian <sup>1</sup> and Suhadiyana binti Hanapi <sup>2*</sup> .....	57
<b>CHAPTER 30</b> .....	59
<b>Portable Drill Press Machine</b> .....	59
Nurul Afiqah Binti Abu Bakri <sup>1</sup> and Suhadiyana binti Hanapi <sup>2*</sup> .....	59
<b>CHAPTER 31</b> .....	61
<b>Design and Fabrication of 3 in 1 Foldable Hand Trolley</b> .....	61
Amir Hassan bin Shamsul Ezam <sup>1</sup> and Hazriel Faizal bin Pahroraji <sup>2*</sup> .....	61
<b>CHAPTER 32</b> .....	63
<b>Design and Fabrication of The Semi-Automated Clothes Wringer</b> .....	63
Muaz Azimuddin bin Afifudden <sup>1</sup> and Hazriel Faizal bin Pahroraji <sup>2*</sup> .....	63
<b>CHAPTER 33</b> .....	65
<b>Design and Fabrication of Automatic Flour Filter</b> .....	65
Muhammad Aqil Fahmy Bin Reduan <sup>1</sup> and Hazriel Faizal bin Pahroraji <sup>2*</sup> .....	65
<b>CHAPTER 34</b> .....	67
<b>Design and Fabrication of Road Footpath Cleaner Machine</b> .....	67
Abdul Fattah Zuhair bin Zukri <sup>1</sup> and Haszeme bin Abu Kasim <sup>2*</sup> .....	67
<b>CHAPTER 35</b> .....	69
<b>Mechanical Pathway Cleaner</b> .....	69

Ahmad Adham Irfan bin Nasrullah <sup>1</sup> and Haszeme bin Abu Kasim <sup>2*</sup> .....	69
<b>CHAPTER 36</b> .....	71
<b>Design and Fabrication of a Consistent Knife Sharpener</b> .....	71
Nik Rafiuddin Rizki bin Abd Razak <sup>1</sup> and Haszeme bin Abu Kasim <sup>2*</sup> .....	71
<b>CHAPTER 37</b> .....	73
<b>Wrapping Device</b> .....	73
Ayuni Faridah Zaid <sup>1</sup> , Mohd Noor Halmy Ab Latif <sup>2*</sup> and Norshadila Ahmad Badela <sup>3</sup> .....	73
<b>CHAPTER 38</b> .....	75
<b>Design and Fabrication of Height Adjustable Study Table</b> .....	75
Irfan Yusuf Mohd Riduan <sup>1</sup> , Mohd Noor Halmy Ab Latif <sup>2*</sup> and Norshadila Ahmad Badela <sup>3</sup> .....	75
<b>CHAPTER 39</b> .....	77
<b>Design and Fabrication of Height Adjustable Study Table</b> .....	77
Haikal Hakimi <sup>1</sup> and Nurulsaidatulsyida Sulong <sup>2*</sup> .....	77
<b>CHAPTER 40</b> .....	79
<b>Design and Fabrication of Automated Mini Forklift</b> .....	79
Fatin Nabila Mohd Zaki <sup>1</sup> , Nur Kamarliah Kamardin <sup>2*</sup> and Ahmad Idzwan Yusuf <sup>3</sup> .....	79
<b>CHAPTER 41</b> .....	81
<b>Design and Fabrication of Coconut Slicer Machine</b> .....	81
Abdul Muhaimin Bin Abd Karim <sup>1</sup> and Ahmad Najmie Rusli <sup>2*</sup> .....	81
<b>CHAPTER 42</b> .....	83
<b>Design and Fabrication of Motorised Sieving Machine</b> .....	83
Mohammad Hariz Azmi <sup>1</sup> and Ahmad Najmie Rusli <sup>2*</sup> .....	83
<b>CHAPTER 43</b> .....	85
<b>Pineapple Tart Mould Machine</b> .....	85
Aini Shaylineka Ab Razak <sup>1</sup> and Ahmad Najmie Rusli <sup>2*</sup> .....	85
<b>CHAPTER 44</b> .....	87
<b>Design and Fabrication of Manual Mini Scooter</b> .....	87
Nuradilah Syafiqah Abdul Razak <sup>1</sup> and Ahmad Najmie Rusli <sup>2*</sup> .....	87
<b>CHAPTER 45</b> .....	89
<b>Design and Fabrication of Garden Storage Tool Cart</b> .....	89
Muhammad Akmal Syahmi Bin Sazaleigh <sup>1</sup> , Najibah Ab Latif <sup>2*</sup> and Ainaa Maya Munira Ismail <sup>3</sup> ..	89
<b>CHAPTER 46</b> .....	91
<b>Tri-Wheel Trolley with Adjustable Holder</b> .....	91
Muhammad Ekhwan Farhan Edzrizar <sup>1</sup> and Abdul Hadi Abdul Rahim @ Ibrahim <sup>2*</sup> .....	91
<b>CHAPTER 47</b> .....	93
<b>Development of a Prototype Pet Litter Sand Filtering Machine</b> .....	93



Muhammad Haziq Haikal Adli Rahimi <sup>1</sup> and Norhisyam Jenal <sup>2*</sup> .....	93
<b>CHAPTER 48</b> .....	95
<b>Development of a Bamboo Hollower Mechanism</b> .....	95
Muhammad Arsyad Anuar <sup>1</sup> and Norhisyam Jenal <sup>2*</sup> .....	95
<b>CHAPTER 49</b> .....	97
<b>Development of a Prototype Vegetable and Fruit Semi-Automatic Slicer Machine</b> .....	97
Muhammad Aimanfikri Md Rizal <sup>1</sup> and Norhisyam Jenal <sup>2*</sup> .....	97
<b>CHAPTER 50</b> .....	99
<b>Design and Fabrication of An Automatic Flour Sieve Machine</b> .....	99
Muhamad Aris Iskandar Mazlan <sup>1</sup> and Norhisyam Jenal <sup>2*</sup> .....	99
<b>CHAPTER 51</b> .....	101
<b>Conceptual Automatic Rempeyek Making Machine</b> .....	101
Ahmad Nor Aafif bin Saharrudin <sup>1</sup> and Siti Khadijah binti Alias <sup>2*</sup> .....	101
<b>CHAPTER 52</b> .....	103
<b>Sliding Grinder Table</b> .....	103
Syazwan Naim bin Sahillah <sup>1</sup> and Siti Khadijah binti Alias <sup>2*</sup> .....	103
<b>CHAPTER 53</b> .....	105
<b>Portable Fresh Coconut Milk Extractor for Small and Medium Industries (SMI)</b> .....	105
Ahmad Syahmi Bin Yusneta <sup>1</sup> , Ab Aziz Mohd Yusof <sup>2*</sup> and Kamariah Md Isa <sup>3</sup> .....	105
<b>CHAPTER 54</b> .....	107
<b>Rubber Tapping Machine for Plantation Industry</b> .....	107
Ahmad Syakir Bin Abdul Rahim <sup>1</sup> , Ab Aziz Mohd Yusof <sup>2*</sup> and Kamariah Md Isa <sup>3</sup> .....	107
<b>CHAPTER 55</b> .....	109
<b>Development of a Hoverboard</b> .....	109
Siti Rafhanah Suwandi <sup>1</sup> and Mohd Fadzli Ismail <sup>2*</sup> .....	109
<b>CHAPTER 56</b> .....	111
<b>Coconut and Durian Skin Peelers Machine</b> .....	111
Akmal Danial Bin Mohd Asri <sup>1</sup> and Norjasween Abdul Malik <sup>2*</sup> .....	111
<b>CHAPTER 57</b> .....	113
<b>Automatic Cat Feeder</b> .....	113
Nur Fatihah Binti Mohd Zainuddin <sup>1</sup> and Norjasween Abdul Malik <sup>2*</sup> .....	113
<b>CHAPTER 58</b> .....	115
<b>Monoshock Compressor</b> .....	115
Othman Al Affan Abd Rashid <sup>1</sup> and Norjasween Abdul Malik <sup>2*</sup> .....	115
<b>CHAPTER 59</b> .....	117
<b>Automatic Drain Rubbish Collector</b> .....	117

Muhammad Farhan Bin Azlan <sup>1</sup> and Azizul Hakim Bin Samsudin <sup>2*</sup> .....	117
<b>CHAPTER 60</b> .....	119
<b>Drone Rigs for Farmers</b> .....	119
Muhammad Irham Haikal Bin Mohamad Rashid <sup>1</sup> and Azizul Hakim Bin Samsudin <sup>2*</sup> .....	119
<b>CHAPTER 61</b> .....	121
<b>Design And Fabrication of Dough Roller Machine</b> .....	121
Muhammad Haziq Bin Mohd Zahir <sup>1</sup> and Miqdad Bin Khairulmaini <sup>2*</sup> .....	121
<b>CHAPTER 62</b> .....	123
<b>Design and Fabrication of Smart Box Conceal for Letter and Parcel</b> .....	123
Muhammad Harraz Hazim Bin Noor Azhar <sup>1</sup> and Zeno Michael <sup>2*</sup> .....	123
<b>CHAPTER 63</b> .....	125
<b>Development of A Prototype Kitchen Cutting Equipment</b> .....	125
Mukhriz Bin Azizi <sup>1</sup> and Zeno Michael <sup>2*</sup> .....	125
<b>CHAPTER 64</b> .....	127
<b>Design and Fabrication of Multifunction Laptop Cooler</b> .....	127
Nadzirul Azizi Bin Norizam <sup>1</sup> and Zeno Michael <sup>2*</sup> .....	127
<b>CHAPTER 65</b> .....	129
<b>Design and Fabrication of Iron Board</b> .....	129
Faris Danial bin Fairuz <sup>1</sup> and Radzi Abdul Rasih <sup>2*</sup> .....	129
<b>CHAPTER 66</b> .....	131
<b>Multifunction Cooler Box for Indoor and Outdoor Usage Application</b> .....	131
Hanis Nabilah binti Khairul Nizam <sup>1</sup> and Radzi Abdul Rasih <sup>2*</sup> .....	131
<b>CHAPTER 67</b> .....	133
<b>Design and Fabrication of Automatic Can Crusher</b> .....	133
Muqri Azfar bin Mohd Faizar <sup>1</sup> and Radzi Abdul Rasih <sup>2*</sup> .....	133
<b>CHAPTER 68</b> .....	135
<b>Automated Adjustable Portable Grill</b> .....	135
Aiman Danial Bin Asrul Effendi <sup>1</sup> and Ahmad Faidzal bin Khodori <sup>2*</sup> .....	135
<b>CHAPTER 69</b> .....	137
<b>Manually Operated Floor Cleaning Machine</b> .....	137
Muhammad Afiq bin Muhamad Nazar <sup>1</sup> and Ahmad Faidzal bin Khodori <sup>2*</sup> .....	137
<b>CHAPTER 70</b> .....	139
<b>Design and Fabrication of a Self-Balancing Device for Food Delivery</b> .....	139
Alif Darwisy Mohd Fauzi <sup>1</sup> , Nur Kamarliah Kamardin <sup>2*</sup> and Ahmad Idzwan Yusuf <sup>3</sup> .....	139
<b>CHAPTER 71</b> .....	141
<b>Sand Sieve Machine</b> .....	141

Danish Farhan Mohd Faizal <sup>1</sup> , Nur Kamarliah Kamardin <sup>2*</sup> and Ahmad Idzwan Yusuf <sup>3</sup> .....	141
<b>CHAPTER 72</b> .....	143
<b>Design and Fabrication of Agricultural Sprayer</b> .....	143
Muhammad Al-Hadi Rusli <sup>1</sup> , Nur Kamarliah Kamardin <sup>2*</sup> and Ahmad Idzwan Yusuf <sup>3</sup> .....	143
<b>CHAPTER 73</b> .....	145
<b>Design and Fabrication of Coconut Milk Extractor Machine</b> .....	145
Haris Luqman Saipulnizam <sup>1</sup> and Ahmad Najmie Rusli <sup>2*</sup> .....	145
<b>CHAPTER 74</b> .....	147
<b>Texture Dough Machine</b> .....	147
Muhammad Afiq Amsyar Bin Mohamad Yusri <sup>1</sup> and Ahmad Najmie Rusli <sup>2*</sup> .....	147
<b>CHAPTER 75</b> .....	149
<b>Mini Injection Molding Machine</b> .....	149
Dayangku Dalalin Amirah Awang Horolni <sup>1</sup> and Ahmad Najmie Rusli <sup>2*</sup> .....	149
<b>CHAPTER 76</b> .....	151
<b>Combined Soil Preparation Machine of Plowing and Crop Boundaries for Smallholder Agriculture</b> .....	151
Lutfil Hadi Bin Suhaimie <sup>1</sup> , Ab Aziz Mohd Yusof <sup>2*</sup> and Kamariah Md Isa <sup>3</sup> .....	151
<b>CHAPTER 77</b> .....	153
<b>Design and Fabrication of Automatic Recycle Bin</b> .....	153
Muhammad Iqbal Wafiuddin Johar <sup>1</sup> and Raja Muhammad Aslam Raja Arif <sup>2*</sup> .....	153
<b>CHAPTER 78</b> .....	155
<b>Development of A Silent Air Purifier and Humidifier Using Water Filter</b> .....	155
Mohamed Fariz Nazmie Mohamed Fauzi <sup>1</sup> and Raja Muhammad Aslam Raja Arif <sup>2*</sup> .....	155
<b>CHAPTER 79</b> .....	157
<b>Design and Fabrication of 2-in-1 Gardening Tools</b> .....	157
Muhammad Ilhan Harith Mohd Faizul <sup>1</sup> and Raja Muhammad Aslam Raja Arif <sup>2*</sup> .....	157
<b>CHAPTER 80</b> .....	159
<b>Design and Fabrication of Multipurpose Agriculture Machine</b> .....	159
Muhammad Muhaimin Haiqal Rozee <sup>1</sup> and Raja Muhammad Aslam Raja Arif <sup>2*</sup> .....	159
<b>CHAPTER 81</b> .....	161
<b>Design and Innovation of The Beach Cleaner</b> .....	161
Mohamad Amirul Danial Zulkifli <sup>1</sup> and Abdul Hadi Abdul Rahim @ Ibrahim <sup>2*</sup> .....	161
<b>CHAPTER 82</b> .....	163
<b>Design and Fabrication of Hydro Fruit Picker</b> .....	163
Muhammad Ammar Hamizan Zolkeplee <sup>1</sup> and Abdul Hadi Abdul Rahim @ Ibrahim <sup>2*</sup> .....	163
<b>CHAPTER 83</b> .....	165

<b>Design and Fabrication of Automatic Foodstuff Cutter</b> .....	165
Muhammad Afiq Aiman Amat Norizam <sup>1</sup> and Abdul Hadi Abdul Rahim @ Ibrahim <sup>2*</sup> .....	165
<b>CHAPTER 84</b> .....	167
<b>Automatic Seed Sowing Machine</b> .....	167
Mohammad Danish Hakim Kasim <sup>1</sup> and Abdul Hadi Abdul Rahim @ Ibrahim <sup>2*</sup> .....	167
<b>CHAPTER 85</b> .....	169
<b>Intelligent Compress Bin</b> .....	169
Muhammad Nabil Nazmi Mohd Nadzir <sup>1</sup> and Abdul Hadi Abdul Rahim @ Ibrahim <sup>2*</sup> .....	169
<b>CHAPTER 86</b> .....	171
<b>Design and Fabrication of Mechanical Sand Purifier</b> .....	171
Ahmad Aiman Suhaimi <sup>1</sup> and Muhamad Faris Syafiq Khalid <sup>2*</sup> .....	171
<b>CHAPTER 87</b> .....	173
<b>Design and Fabrication of Portable Solar Cooker</b> .....	173
Intanku Sofea Mohamad Zaidi <sup>1</sup> and Muhamad Faris Syafiq Khalid <sup>2*</sup> .....	173
<b>CHAPTER 88</b> .....	175
<b>Design and Fabrication of Coins Separator Machine</b> .....	175
Nur Dania Irdeena Astapa Kamal <sup>1</sup> and Muhamad Faris Syafiq Khalid <sup>2*</sup> .....	175
<b>CHAPTER 89</b> .....	177
<b>Design and Fabrication of Automatic Sweeper</b> .....	177
Khairul Fikri Mohd Khairi <sup>1</sup> and Norhisyam Jenal <sup>2*</sup> .....	177
<b>CHAPTER 90</b> .....	179
<b>Design and Fabrication of Automatic Thermoforming Plastic Machine</b> .....	179
Amerul Aiezed bin Azhari <sup>1</sup> and Siti Khadijah binti Alias <sup>2*</sup> .....	179
<b>CHAPTER 91</b> .....	181
<b>Sliding Grinder Table</b> .....	181
Muhammad Safwan Haziq Bin Harif Fadzilla <sup>1</sup> and Siti Khadijah binti Alias <sup>2*</sup> .....	181
<b>CHAPTER 92</b> .....	183
<b>Automatic Whiteboard Cleaner</b> .....	183
Haziq Syakir bin Ismail <sup>1</sup> and Hazriel Faizal bin Pahroraji <sup>2*</sup> .....	183
<b>CHAPTER 93</b> .....	185
<b>Design and Fabrication of Hydraulic Pipe Bending Machine</b> .....	185
Mohamad Asyraf Bin Zainal <sup>1</sup> and Hazriel Faizal bin Pahroraji <sup>2*</sup> .....	185
<b>CHAPTER 94</b> .....	187
<b>Automated Wrapping Machine</b> .....	187
Ammar Arham <sup>1</sup> , Azulaifiz Fauzan Aznam <sup>2</sup> , Mohd Noor Halmy Ab Latif <sup>3*</sup> and Norshadila Ahmad Badela <sup>4</sup> .....	187

<b>CHAPTER 95</b> .....	189
<b>Design and Fabrication of Double Automatic Can Crusher</b> .....	189
Adib Farhan bin Badrol Isa <sup>1</sup> and Nurul Hanna binti Mas'aud <sup>2*</sup> .....	189
<b>CHAPTER 96</b> .....	191
<b>Ergonomic Height Adjustable Desk</b> .....	191
Ammar Hakim bin Aidi <sup>1</sup> and Nurul Hanna binti Mas'aud <sup>2*</sup> .....	191
<b>CHAPTER 97</b> .....	193
<b>Fish Cake Forming Machine</b> .....	193
Hana Binti Razali <sup>1</sup> and Nurul Hanna binti Mas'aud <sup>2*</sup> .....	193
<b>CHAPTER 98</b> .....	195
<b>Design and Fabrication of Motorized Food Packer</b> .....	195
Muhammad Haziq Irfan Bin Yusrizam <sup>1</sup> and Nurulsaidatulsyida Sulong <sup>2*</sup> .....	195
<b>CHAPTER 99</b> .....	197
<b>Design and Fabrication of Rice Washing Machine</b> .....	197
Muhammad Luqman Arif Bin Mohd Azmi <sup>1</sup> and Nurulsaidatulsyida Sulong <sup>2*</sup> .....	197
<b>CHAPTER 100</b> .....	199
<b>Automatic Motorbike Side Stand</b> .....	199
Muhammad Amir bin Roslan <sup>1</sup> and Suhadiyana binti Hanapi <sup>2*</sup> .....	199
<b>CHAPTER 101</b> .....	201
<b>Coconut Automatic Machine Grinder</b> .....	201
Nadiatul Aiman Binti Abd. Hamid <sup>1</sup> and Azizul Hakim Bin Samsudin <sup>2*</sup> .....	201
<b>CHAPTER 102</b> .....	203
<b>Automatic Spinning Underclothing Hanger</b> .....	203
Muhammad Haikal Haziq Bin Abdul Razak <sup>1</sup> and Nur Aini Sabrin Manssor <sup>2*</sup> .....	203
<b>CHAPTER 103</b> .....	205
<b>Development of a Prototype Motion Sensor Mini Candy Dispenser</b> .....	205
Muhammad Luqman Bin Khusairi <sup>1</sup> and Nur Aini Sabrin Manssor <sup>2*</sup> .....	205
<b>CHAPTER 104</b> .....	207
<b>Design and Fabrication of Vegetables Dicer</b> .....	207
Muhammad Luqman bin Nasaruddin <sup>1</sup> and Zeno Michael <sup>2*</sup> .....	207
<b>CHAPTER 105</b> .....	209
<b>Agricultural Sprayer Machine</b> .....	209
Amir Hakim bin Azmi <sup>1</sup> and Ahmad Faidzal bin Khodori <sup>2*</sup> .....	209
<b>CHAPTER 106</b> .....	211
<b>Automatic Sand Sieve</b> .....	211
Adam Afiq bin Khairulfaizal <sup>1</sup> and Ahmad Faidzal bin Khodori <sup>2*</sup> .....	211

<b>CHAPTER 107</b> .....	213
<b>Design and Fabrication of Agriculture Wheel Pump</b> .....	213
Muhammad Hakimi Bin Hamsah <sup>1</sup> and Nurulnatisya Binti Ahmad <sup>2*</sup> .....	213
<b>CHAPTER 108</b> .....	215
<b>Design and Fabrication of Agriculture Multi Sprayer</b> .....	215
Nabil Najwan Bin Salehudin Alayob <sup>1</sup> and Syidatul Akma Sulaiman <sup>2*</sup> .....	215
<b>CHAPTER 109</b> .....	217
<b>Design and Fabrication of Ecofriendly Sweeper</b> .....	217
Siti Nur Faqiha Binti Mohd Yasin <sup>1</sup> and Syidatul Akma Sulaiman <sup>2*</sup> .....	217
<b>CHAPTER 110</b> .....	219
<b>Design and Fabrication of 4 Way Nut Remover</b> .....	219
Muhammad Irfanhaikal Bin Ikhmal Albakri <sup>1</sup> and Syidatul Akma Sulaiman <sup>2*</sup> .....	219
<b>CHAPTER 111</b> .....	221
<b>Development and Designing a Folding Bicycle Stand</b> .....	221
Raja Imran Hakimi Bin Raja Ahmad Shukri <sup>1</sup> and Hazim Sharudin <sup>2*</sup> .....	221
<b>CHAPTER 112</b> .....	223
<b>Experimental Investigation on The Generation of Electrical Power Using Gymnasium Bicycle</b> .....	223
Wan NurMuhammad Bin Wan Mohamed Tarmizi <sup>1</sup> and Hazim Sharudin <sup>2*</sup> .....	223
<b>CHAPTER 113</b> .....	225
<b>Design and Fabrication of GPS Bicycle Tracking</b> .....	225
Siti Nur Hanisah Binti Noor Azmi <sup>1</sup> and Hazim Sharudin <sup>2*</sup> .....	225
<b>CHAPTER 114</b> .....	227
<b>Adjustable Wide Multifunctional Trolley</b> .....	227
Muhammad Saiful Aiman bin Mohd Zin <sup>1</sup> and Ab Aziz Mohd Yusof <sup>2*</sup> .....	227
<b>CHAPTER 115</b> .....	229
<b>Automatic Knife Sharpener</b> .....	229
Mohamad Naqib Bin Norlizan <sup>1</sup> , Noor Hafiz Noordin <sup>2</sup> and Mohd Ghazali Mohd Hamami <sup>3*</sup> ....	229
<b>CHAPTER 116</b> .....	231
<b>Automatic Flour Sieving Machine</b> .....	231
Muhamad Haikal Aiman Bin Mohamad Rashidi <sup>1</sup> , Noor Hafiz Noordin <sup>2</sup> and Mohd Ghazali Mohd Hamami <sup>3*</sup> .....	231
<b>CHAPTER 117</b> .....	233
<b>Mini Cooling Fridge using Peltier</b> .....	233
Muhammad Adam Bin Abdullah <sup>1</sup> , Noor Hafiz Noordin <sup>2</sup> and Mohd Ghazali Mohd Hamami <sup>3*</sup>	233
<b>CHAPTER 118</b> .....	235

<b>Beach Cleaning Machine</b> .....	235
Muhammad Ashraf Aiman Bin Hairulnizam <sup>1</sup> , Noor Hafiz Noordin <sup>2</sup> and Mohd Ghazali Mohd Hamami <sup>3*</sup> .....	235
<b>CHAPTER 119</b> .....	237
<b>Mini Conveyor Belt Using Geneva Mechanism</b> .....	237
Muhammad Hariz Luqman bin Mohd Huszeine <sup>1</sup> and Suhadiyana binti Hanapi <sup>2*</sup> .....	237
<b>CHAPTER 120</b> .....	239
<b>Design and Fabrication of a Mini Dishwasher</b> .....	239
Muhammad Zikry Bin Saifullah <sup>1</sup> and Nur Aini Sabrin Manssor <sup>2*</sup> .....	239
<b>CHAPTER 121</b> .....	241
<b>Design, Analysis, and Fabrication of An Automatic Wireless Door Lock</b> .....	241
Nu'man Shafiq Bin Shahrin <sup>1</sup> and Zeno Michael <sup>2*</sup> .....	241
<b>CHAPTER 122</b> .....	243
<b>Innovative Garbage Collector for Small Worker Application</b> .....	243
Luqmanul Hakim bin Jamingan <sup>1</sup> and Radzi Abdul Rasih <sup>2*</sup> .....	243
<b>CHAPTER 123</b> .....	245
<b>Automatic Watering System for Plants Using Arduino</b> .....	245
Syahmi Bin Sarifuddin <sup>1</sup> and Nurulnatisya Binti Ahmad <sup>2*</sup> .....	245
<b>Mechanical Design of Automatic Beach Cleaner</b> .....	247
Muhammad Qaiyim Almunawwar Bin Ahmad Zawave <sup>1</sup> and Nurulnatisya Binti Ahmad <sup>2*</sup> .....	247
<b>CHAPTER 125</b> .....	249
<b>Design and Fabrication of Slicer with Many Blade</b> .....	249
Muhammad Nur Falah Bin Mohd Nizafar <sup>1</sup> and Nurulnatisya Binti Ahmad <sup>2*</sup> .....	249
<b>CHAPTER 126</b> .....	251
<b>Mini Solar Water Heater</b> .....	251
Muhammad Luqman Bin Khairi <sup>1</sup> and Nurulnatisya Binti Ahmad <sup>2*</sup> .....	251
<b>CHAPTER 127</b> .....	253
<b>Design and Fabrication of Hydraulic-Assisted Rehabilitation Model</b> .....	253
Akif Akmal Bin Shahrol Ismail <sup>1</sup> and Nurulnatisya Binti Ahmad <sup>2*</sup> .....	253
<b>CHAPTER 128</b> .....	255
<b>Design and Fabrication of Pressure Jack</b> .....	255
Muhammad Saiful Anuar Bin Aminnudin <sup>1</sup> and Syidatul Akma Sulaiman <sup>2*</sup> .....	255
<b>CHAPTER 129</b> .....	257
<b>Design and Fabrication of a Multipurpose Trolley</b> .....	257
Wan Adam Mirza Wan Jeffry <sup>1</sup> and Syidatul Akma Sulaiman <sup>2*</sup> .....	257
<b>CHAPTER 130</b> .....	259

<b>Design and Fabrication of an Automated Mini Hacksaw</b> .....	259
Muhammad Muqri Aniq Bin Zakaria <sup>1</sup> and Syidatul Akma Sulaiman <sup>2*</sup> .....	259
<b>CHAPTER 131</b> .....	261
<b>Design and Fabrication of an Automated Puri and Capati Maker</b> .....	261
Muhammad Harraz Luqman Bin Mohd Huszeine <sup>1</sup> and Syidatul Akma Sulaiman <sup>2*</sup> .....	261
<b>CHAPTER 132</b> .....	263
<b>Design and Fabrication of Can Presser</b> .....	263
Muhammad Haqimie Mohd Nasri <sup>1</sup> and Raja Muhammad Aslam Raja Arif <sup>2*</sup> .....	263
<b>CHAPTER 133</b> .....	265
<b>Agriculture Pump Sprayer Trolley</b> .....	265
Muhammad Shazril Nazmi Mohd Nizam <sup>1</sup> and Abdul Hadi Abdul Rahim @ Ibrahim <sup>2*</sup> .....	265
<b>CHAPTER 134</b> .....	267
<b>Design and Fabrication of An Egg Peeler</b> .....	267
Muhammad Ariff Mansor <sup>1</sup> and Abdul Hadi Abdul Rahim @ Ibrahim <sup>2*</sup> .....	267
<b>CHAPTER 135</b> .....	269
<b>Design and Fabrication of Automatic Flour Filter and Separator</b> .....	269
Muhammad Amir Haziq Mohd Yusri <sup>1</sup> and Nurrul Amilin Zainal Abidin <sup>2*</sup> .....	269
<b>CHAPTER 136</b> .....	271
<b>Design and Fabrication of Vegetable Cutting Machine</b> .....	271
Muhammad Hakimie Md Mokhtar <sup>1</sup> and Nurrul Amilin Zainal Abidin <sup>2*</sup> .....	271
<b>CHAPTER 137</b> .....	273
<b>Design and Fabrication of Flatbread Dough Maker</b> .....	273
Muhammad Iskandar bin Ahmad Zulfaqar <sup>1</sup> and Nurrul Amilin Zainal Abidin <sup>2*</sup> .....	273
<b>CHAPTER 138</b> .....	275
<b>Loose Fruit Collector and Instant Packaging Machine for Palm Oil Industry</b> .....	275
Akmal Lutfi Mohamad <sup>1</sup> , Kamariah Md Isa <sup>2*</sup> and Ab Aziz Mohd Yusof <sup>3</sup> .....	275
<b>CHAPTER 139</b> .....	277
<b>Semi Automatic Egg Washer for Egg Production</b> .....	277
Alan Kennedy Anak Sylvester Maluh <sup>1</sup> , Kamariah Md Isa <sup>2*</sup> and Ab Aziz Mohd Yusof <sup>3</sup> .....	277
<b>CHAPTER 140</b> .....	279
<b>Manually Operated Onions Grading Machine for the Agricultural Product</b> .....	279
Intan Nur Mawaddah binti Mohd Sham <sup>1</sup> , Kamariah Md Isa <sup>2*</sup> and Ab Aziz Mohd Yusof <sup>3</sup> .....	279
<b>CHAPTER 141</b> .....	281
<b>Development of a Vegetable Slicing Machine</b> .....	281
Adil Ariff <sup>1</sup> and Mohd Fadzli Ismail <sup>2*</sup> .....	281
<b>CHAPTER 142</b> .....	283



<b>Design and Fabrication of Motorized Car Jack</b> .....	283
Muhammad Irfan Naqiuddin Talib <sup>1</sup> and Mohd Fadzli Ismail <sup>2*</sup> .....	283
<b>CHAPTER 143</b> .....	285
<b>Design and Fabrication of Semi-Automatic Pestle and Mortar Machine</b> .....	285
Muhammad Izzat Lukman <sup>1</sup> and Mohd Fadzli Ismail <sup>2*</sup> .....	285
<b>CHAPTER 144</b> .....	287
<b>Design and Fabrication of Wet Clothes' Spinning Machine</b> .....	287
Nadzirah Huda Ariuddin <sup>1</sup> and Mohd Fadzli Ismail <sup>2*</sup> .....	287
<b>CHAPTER 145</b> .....	289
<b>Development of a Clothes Folding Machine</b> .....	289
Nur Aliesya Mohamad Saifol <sup>1</sup> and Mohd Fadzli Ismail <sup>2*</sup> .....	289
<b>CHAPTER 146</b> .....	291
<b>Development of a Clothes Folding Machine</b> .....	291
Azlan Shah Kamarul Kalai <sup>1</sup> and Nor Liawati Abu Othman <sup>2*</sup> .....	291
<b>Reference</b> .....	293

## CHAPTER 127

### Design and Fabrication of Hydraulic-Assisted Rehabilitation Model

Akif Akmal Bin Shahrol Ismail <sup>1</sup> and Nurulnatisya Binti Ahmad <sup>2\*</sup>

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

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

#### PROJECT DESCRIPTION

Stroke is a common disease in Malaysia and is the second highest of death and disability combined. Modern rehabilitation techniques demonstrated that technology plays an important role in rehabilitation, especially for stroke victims. Those who are suffering from paralysis require assistance to perform rehabilitation, given their limited hand function. The main objective of this project is to design and fabricate hydraulic-assisted rehabilitation model to help them who suffers hand paralysis in their rehabilitation process. The second objective is to move the items that they unable to reach easily without using any drastic movements. This model mainly consists of five syringes at each end that can move the main part of the model and the model only uses hydraulic to move so no electricity required. It also includes a magnet at the end of one of the syringes to pick metal items. The process of making the product include cutting, drilling, bending, assembling, and installing. The results of this product are that is successfully move when the controller is controlled by the user and can help user to move and stretch their fingers. In conclusion, the people who undergoes rehabilitation due to paralysis is expected to get better and recover through this project.

**Keywords:** *Design, Rehabilitation, Model, Hydraulic*

#### PROTOTYPE



**DESIGN PARAMETER**

