

**DEVELOPMENT OF SPEED IN PEDAL EXERCISER FOR
PARKINSON'S DISEASE PATIENT**

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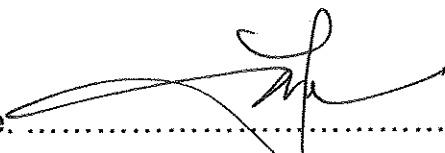
**This Report Is Submitted In Partial Fulfillment Of The
Requirements For Bachelor Of Electronic Engineering Technology
(Medical Electronic) With Honours**

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ENDORSEMENT

“I hereby acknowledge that I have read this report and I find that its contents meet the requirements in terms of scope and quality for the award of the Bachelor Of Electronic Engineering Technology (Medical Electronic) With Honours”

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DECLARATION

**“We hereby declare that the work in this report is our own
except for the quotation and summaries which have been
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ABSTRACT

Pedal exerciser is one of rehabilitation device that help patient with upper and lower extremity problem. The pedal exerciser is use for arms and legs. Pedal exercisers are portable and resemble crank pedals of traditional bicycle. In this study, pedal exerciser are innovated from manual pedaling to pedaling with the help of motorization, the function are including the speed. The purpose of this project is to upgrade the existing pedal exerciser with new material which is thermoplastic rubber of pedal exerciser rubber feet so that it can grip well and non-slip during pedaling session. In addition, this innovation is come with an adjustable speed to conduct the study about relationship between Parkinson's disease subject and the use of pedal exerciser as their therapy. The movement of speed will work by stepper motor while the software will be help by Peripheral Interface Controller (PIC). This project will be conduct in two ways of data collection, that is in technically and evaluation. This study is to analysis the problems that always occur on the pedal exerciser and find a solution to solve it. Besides, modification of pedal exerciser is to help the Parkinson's disease patient which is stated that fast pedaling will help to short the time recovery of them. As a result, shows that the tactic and the used of pedal exerciser is relevant to the Parkinson's disease patient and also to the other user.

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Chapter 1

Introduction

1.1 Background of study

Pedal exerciser is one of rehabilitation device that help patient with upper and lower extremity problem. The pedal exerciser is use for arms and legs. It is portable and resembles crank pedals of traditional bicycle. While motions used for the pedal exerciser and the stationary bike a similar, the two pieces of equipment are very different in function, design and features. Pedal exercisers are used by types of person such as Parkinson's patient, stroke patient, patient that have been through accident and need legs or arms exercise and patient with artificial legs and arms. Normal people can use pedal exerciser too for workout. Pedal exerciser can increase the heart rate and breaking a sweat isn't just good for blood circulation, but when incorporated regularly it can improve mood, help to stave off obesity and even improve heart's health.

From the survey by collecting data through interviewing the physiotherapy, nurses and technical person, beside than doing research, there are some

problem statements that have been found and need improvement in existing pedal exerciser. Common problem with pedal exerciser are slipping of floor while pedalling. Rather than looking on the technical problem, there are also treatment problem solving included. In this research, Parkinson disease is the disease that has been focused. A research study by Jay Alberts (PhD), he is a biomedical engineer from Cleveland Clinic, shows that a forced exercise can help as a Parkinson's disease therapy treatment[1]. Each and every day, people with Parkinson's disease awaken, trapped in their bodies. Their limbs are stiff, their hands shake and their legs won't follow their brain[2].

1.2 Problem statement

From the survey by collecting data through interviewing the physiotherapy, nurses and technical person, beside than doing research, there are some problem statements that have been found and need improvement in existing pedal exerciser. Common problem with pedal exerciser are slipping of floor while pedaling. Rather than looking on the technical problem, there are also treatment problem solving included. Pedal exercisers are often moving to front during patient's exercise session. Same goes to the chair that has been used, it is sliding while pedaling. Some pedal exerciser are having this problem because of the leg's rubber, it is not gripping well on certain type of floor. This situation cause uncomfortable feeling to the patient.

Rather than looking on the technical problem, there are also treatment problem solving included. There is a fact that by using tandem bicycle, Parkinson's disease can be heal, so that one of the purpose in this study is to help Parkinson's disease patient do exercise whenever they want without have to goes out from home. Tandem bicycle have the same cycling theory of

pedal exerciser, so it should be fine if therapist use pedal exerciser to help Parkinson's disease patient.

1.3 Objective

The main objective of this project is:-

- (i) To upgrade the existing pedal exerciser to become an adjustable speed and resistance, comfortable to use, easy to handle and easy to carry.

In order to achieve the main objective, the sub objectives are as below:-

- (ii) To analysis about the material of pedal exerciser and leg's rubber on pedal exerciser.
- (iii) To study the relationship between Parkinson's subject and the use of pedal exerciser as their therapy.

1.4 Study population

In this study, the subjects are consists of public with or without ankle, foot or knee pain for the usability test and Parkinson's disease patient who are desire to heal. The population of subjects are among the Polytechnic Premier Sultan Salahuddin Abdul Aziz Shah, Shah Alam, focusing in Electrical Engineering Department. For Parkinson's disease patient, they are from Salam Hospital Shah Alam and Hospital Tengku Ampuan Rahimah, Klang.

This study have its own inclusion and exclusion criteria, which is for inclusion criteria, the scope of this study is focusing on the individual that can still make legs movement and walking around but not really well, and the Parkinson's disease patient in level 1 to level 3. For exclusive criteria, it is criteria which is not included and also not suitable in this study. Exclusive criteria are included individual that cannot even move their legs and can't afford to walk at all, and also the Parkinson's disease patient of level 4 to level 5.

1.5 Sample size and sampling technique

In this study, Krejcie and Morgan theory has been used to determine the sample size. The population of limitation for this study is 30 subjects, so that the sample size will be 28 subjects including Parkinson's disease patient and individual with ankle, knee and legs pain for the analysis of technical and evaluation test.

N	S	N	S	N	S	N	S	N	S
10	10	100	50	280	162	800	260	2800	338
15	14	110	56	290	163	835	263	3000	341
20	19	120	62	300	169	900	269	3500	346
25	24	130	67	320	173	950	274	4000	351
30	28	140	73	340	181	1000	278	4500	354
35	32	150	79	360	186	1100	285	5000	357
40	36	160	85	380	191	1200	291	6000	361
45	40	170	91	400	196	1300	297	7000	364
50	44	180	97	420	201	1400	302	8000	367
55	48	190	103	440	205	1500	306	9000	368
60	52	200	109	460	210	1600	310	10000	370
65	56	210	115	480	214	1700	313	15000	373
70	59	220	121	500	217	1800	317	20000	377
75	63	230	127	550	226	1900	320	30000	379
80	66	240	133	600	234	2000	322	40000	380
85	70	250	139	650	242	2200	327	50000	381
90	73	260	145	700	248	2400	331	75000	382
95	76	270	151	750	254	2600	335	100000	384

Note: N is Population Size; S is Sample Size Source: Krejcie & Morgan, 1970

Table 1.1 : Krejcie and Morgan table for determine sample size

1.6 Significant of study

This study is to analysis the problems that always occur on the pedal exerciser and find a solution to solve it. Besides, modification of pedal exerciser is to help the Parkinson's disease patient which is stated that fast pedalling will help to short the time recovery of them. Pedal exerciser can be used in various levels of ages of human.

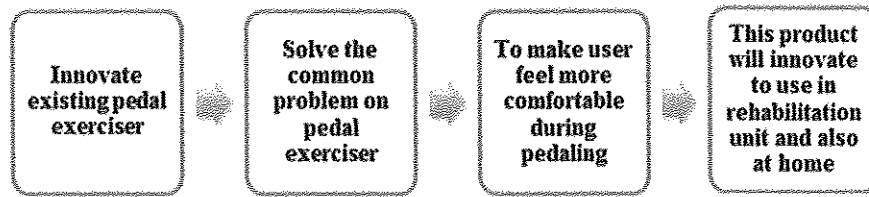


Figure 1.1 : Significant of study

1.7 Theoretical of the study

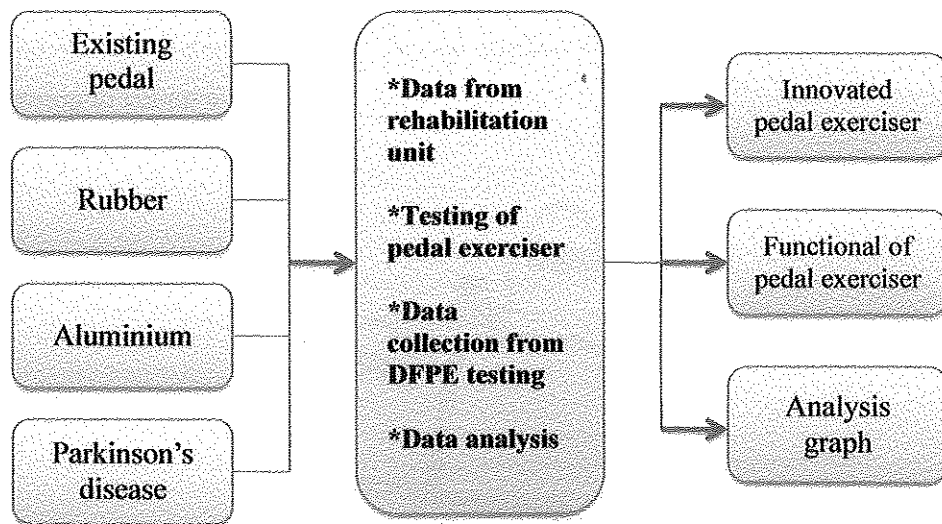


Figure 1.2 : Theoretical of study

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