



Faculty of Electrical and Electronic Engineering Technology



**Development of Electrical Power Generation Using Speed
Breaker**

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Bachelor of Electrical Engineering Technology (Industrial Power) with Honours

2022

Development of Electrical Power Generation Using Speed Breaker

MUHAMAD TAUFIK BIN MD ISA

**A project report submitted
in partial fulfillment of the requirements for the degree of
Bachelor of Electrical Engineering Technology (Industrial Power) with Honours**



Faculty of Electrical and Electronic Engineering Technology

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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**BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II**

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Universiti Teknikal Malaysia Melaka

Tarikh: 9/1/2023

Tarikh: 13/1/2023

DECLARATION

I declare that this project report entitled “Project Title” is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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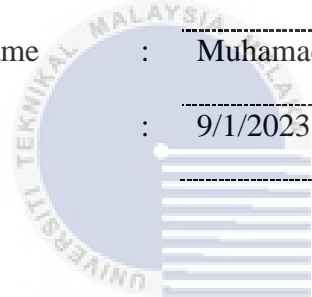
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APPROVAL

I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Electrical Engineering Technology (Industrial Power) with Honours

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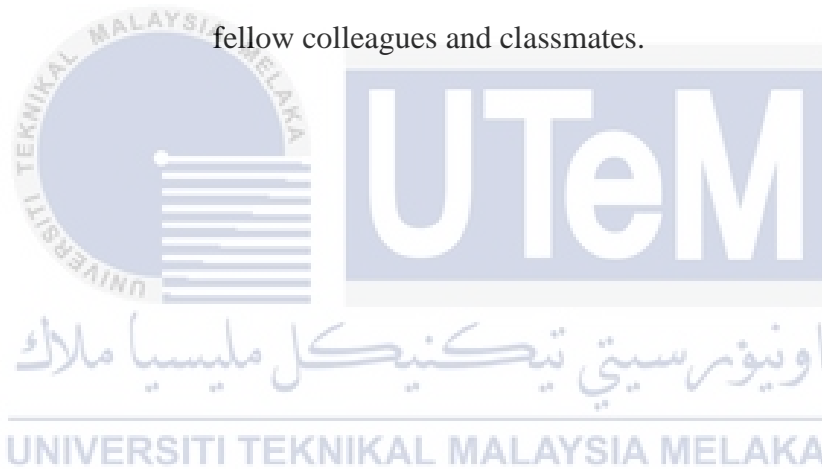
DEDICATION

*To my beloved mother, Yati Binti Dumun.
and father, Md Isa Bin Md Nor*

To my adored family, brother and sister

*To my team member, Muhammad Syukri Suliaman, Muhamad Faiz bin Ahmad Zohri,
Muhammad Haziq Kharil Azri, Muhammad Hariz bin Hasri,
Muhammed Adam Bari' bin Yuspaliza
and to all*

fellow colleagues and classmates.



ABSTRACT

Power consumption has risen dramatically in recent years. Diverse setups for effective power generator have been created to meet the need for power by various units. In this project, electrical power is created in a non-conventional way by simply driving a vehicle over a specifically engineered roller system. The process of generating electricity requires no electric input. This project makes use of a simple mechanical system by a roller mechanism, some electrically interfaced parts, and then a chain drive arrangement. The main idea is by using the vehicle weight and speed to transform mechanical energy into electricity from potential and kinetic energy. The process of creating electricity is described using the mechanism of an electrical power generator based on kinetic energy. The speed breaker generation system harnesses the acceleration of cars passing on a speed breaker area to generate electricity. The special design of roller mechanisms at speed breakers are a major factor that generate electric energy. Once the vehicle passes over the rollers, mechanical energy is generated, and a generator capable of generating DC current is operated by a specifically built mechanism.

ABSTRAK

Penggunaan kuasa telah meningkat secara mendadak dalam beberapa tahun kebelakangan ini. Persediaan yang pelbagai untuk penjana kuasa yang berkesan telah dibuat untuk memenuhi keperluan kuasa oleh pelbagai unit. Dalam projek ini, kuasa elektrik dicipta dengan cara yang tidak konvensional dengan hanya memandu kenderaan ke atas sistem roller yang direkayasa khusus. Proses menjana elektrik tidak memerlukan sebarang input elektrik. Projek ini menggunakan sistem mekanikal mudah dengan mekanisme roller, beberapa bahagian antara muka elektrik, dan kemudian susunan pemacu rantai. Idea utama adalah dengan menggunakan berat dan kelajuan kenderaan untuk mengubah tenaga mekanikal menjadi elektrik dari tenaga yang berpotensi dan kinetik. Proses mencipta elektrik diterangkan menggunakan mekanisme penjana kuasa elektrik berdasarkan tenaga kinetik. Sistem penjanaan pemutus kelajuan memanfaatkan pecutan kereta yang melalui kawasan pemutus kelajuan untuk menjana elektrik. Reka bentuk khas mekanisme roller pada pemutus kelajuan adalah faktor utama yang menjana tenaga elektrik. Sebaik sahaja kenderaan melepasi penggelek, tenaga mekanikal dijana, dan penjana yang mampu menjana arus DC dikendalikan oleh mekanisme yang dibina khusus.

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LIST OF ABBREVIATIONS

V	-	Voltage
DC	-	Direct current
AC	-	Alternating current
W	-	Watt
LDR	-	Light dependent resistor
KM/H	-	Kilometer per hour
SBPG	-	Speed Breaker Power Generation
NiCad	-	nickel cadmium
NiMH	-	nickel metal hydride
Li-ion	-	lithium ion
MSB	-	Model Speed Breaker



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CHAPTER 1

INTRODUCTION

1.1 Background

Nowadays, electrical energy very important in human daily life. The amount of energy consume increasing on a daily basis. Higher electricity demand necessitates a reduction in conventional energy resources for generation, as well as an increase in pollutant emissions. However, we know that power generation resources are limited, which has resulted in the energy crisis. In order to minimize conventional energy resources, we have to find new energy that become environmentally friendly.

Otherwise, we can see that the road traffic is currently busy cause of increasing the number of vehicles. Accordingly, it makes the flow of traffic become rushed load and busier that become problem to another consumer of the road. Therefore, speed breaker is used to control the flow of traffic on some rode. Conventionally, that have a kinetic energy by the vehicle pass through the speed breaker. Electricity can be generated using the weight of vehicle in proportion to potential energy. By repurposing energy that would otherwise be wasted, this can save energy that could have been used to power up the load.

1.2 Problem Statement

The idea come when mostly equipment at road traffic like street lighting, traffic light, billboards, bus-stop and building near the road is supplied by TNB power. Besides that, the ratio of electricity demand is steadily increasing. However, we are aware that electricity producing resources are limited. As a result, we must

develop ways to increase the amount of electricity saved at road traffic. Thus, by diverting energy that would otherwise be wasted, this can save energy that could have been used to power up the load. By using potential energy on weight and kinetic energy that produced by vehicle pass through the speed breaker. This kinetic energy can be harvest and be convert to electrical energy.

1.3 Project Objective

The goals of this study are:

- i. Convert the Potential and kinetic energy (dynamic of moving vehicle) for generating power.
- ii. Design the generating system by pollution free energy that eco-friendly to environment.
- iii. Analyze how the system work due to road way.

1.4 Scope of Project

The scope of this project are as follows:

- i. Generated power for electrical component that present near the speed breaker.
- ii. Generating electrical energy by using dynamic of vehicle with potential and kinetic energy bypass through the speed breaker.
- iii. Battery storage module have been used to stored DC power because inability of continous source.
- iv. The concept of harvest electricity for speed breaker generation by using only roller mechanism.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will talk about the theory that goes into this project. Besides that, the previous research that I gained has been understudy in order to gain valuable data for this project. It also helps me to finish this project.

2.2 System control

2.2.1 Speed breaker Power Generator

Speed-breakers are devices that impede movement and are widely employed to reduce speed-related accidents. [1] The Speed breakers are intended to be turned over at a specified agreeable pace, inflicting extreme inconvenience at greater rates. The drop in typical vehicular speed increases the security of persons in the surroundings greatly. The vast majority of these technologies may be found in underdeveloped nations. [2] As a result, several developing nations, such Ghana, India, the Egyptian Empire, Chile , and Pakistan, use speed breakers. [3]

Speed Breakers are being used to manage traffic flow on rushed loads. The annualized average of vehicle growth in Pakistan is rising by the day. Vehicle weight, in terms of the potential energy, can be used to create electricity. [4]

The research being created a way for generating power on the roads utilising speed bumps . To obtain maximum power, the movement of passing vehicles is critical. This mechanism employs a rack and pinion system. This system turns the

kinetic energy of moving automobiles into electric energy with the help of a speed breaker on the road.

This generates numerous kilowatts of power simply moving the rack lower and upward. Load causes downward motion, and restoring pressure through the use of energy stored in springs causes upward motion.

Designing a pollutant-free energy producing system is critical. The speed breaker generation system is the most contemporary approach for creating electrical energy with minimal input (SBPG). This report presents an experimental research that used SBPG to generate power. In this method, power is generated using a rack and pinion mechanism. When a vehicle passes through the speed breaker, the rack drops to generate linear to rotational motion via pinions. The rotating movement is transmitted to a direct current generator, which provides direct current power, which is stored in a battery similar the solar energy does.

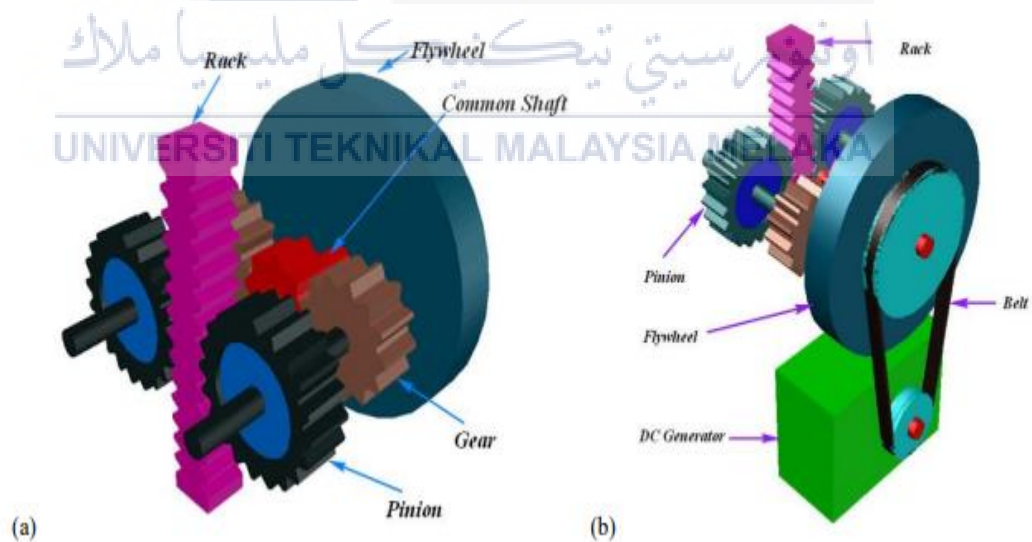


Figure 2.1 Rack and pinion mechanism

2.2.2 Power Generation using Speed Breaker

Electricity is a topic that is on everyone's mind these days. It is now possible to do so while driving a car or riding a two-wheeler. When we drive or ride over a speed breaker, we can do this. You read that correctly: while riding or driving over a speed breaker.

Traditional speed breakers are only used to reduce the speed of a vehicle, which is entirely dependent on the material used to make the speed breakers.

These speed breakers are sometimes made of rubber, sometimes of concrete, and sometimes of a combination of concrete and pavements. This can be accomplished by incorporating some simple mechanisms under the speed breakers. A rack and pinion gear is one such simple mechanism, while a small generator with some wiring is another. Here is how we can implement the power generation programmed from the speed breakers with the help of these small mechanisms.

The mechanical energy is used to convert kinetic energy to electric energy in this power generation programmed. This is possible because kinetic energy is produced when the brakes are applied to the vehicle. The kinetic energy is then converted to mechanical energy using a rack and pinion gear, and the mechanical energy is converted to electrical energy by connecting the pinion gear to a generator shaft.[6]

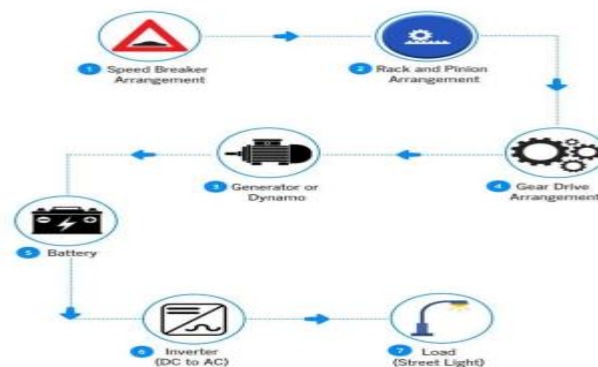


Figure 2.2 Block diagram rack and pinion mechanism

2.3 Mechanism used

2.3.1 Design of Power Generation Unit Using Roller Mechanism

A road track can be used to generate power by passing vehicles over a rollers mechanism put up. Renewable energies are recognised as an effective alternative energy for lowering carbon dioxide emissions. [7] Unlike typical speed breaker, the roller mechanism configuration will not cause vehicle damage or fuel waste while travelling over the rollers. The biggest benefit is that they produce energy for free. The Electro-Kinetic generation system can generate up to 10kW of power, which could then be utilised to power signage, street lights or stored in a battery for later use. The track is composed of steel rollers that rotate in response to those forces exerted by passing cars.

The action of the rollers powers a newly created design, which drives a generator, which generates electricity. The rollers' repeated rotations, which are further coupled with another free wheel, enabling it to rotate freely in between while vehicles travel over the track. There is limited research on kinetic energy extraction from vehicle flow on roadways. As a result, an appropriate and effective topology for the construction of a power generation system for the harvesting of kinetic energy by transportation is required.

A roller is positioned among two speed breakers in this Mechanism, and a grip is supplied speed breaker when a vehicle crosses over it, it turns the roller. This roller action is utilised to rotate the shaft of the alternating current generators via the chain drive, which enables varied speed ratios. As the shaft of a dc power generator