

HUMAN POWERED VEHICLE

Mr.Sanit Srivastava, Mr.Sujay Poojary, Assistant Prof. Gunchita Wadhwa, Assistant Prof. Shivaji Sagar
Pursuing B.Tech (Mechanical), Pursuing B.Tech (Mechanical), M.Sc (Mechanical), M.Tech (Mechanical)
Mechanical & Automation Engineering,
Amity University, Navi Mumbai, Maharashtra, India

ABSTRACT- *The study of renewable energy sources is an important topic in the field of energy management. Today the entire world is facing the problem of energy crisis. To solve the problem of energy crisis we have to make use of renewable energy sources for the production of energy required in our day-to-day life. Our country mainly depends on non-renewable energy sources for power generation, so the main aim of this paper is to put forth an idea in which we use human energy instead of any non-conventional energy. This research paper focuses on using a manual treadmill to create human-powered vehicle and this vehicle can be run by human energy and it does not create any kind of pollution. The main purpose to build this vehicle is to introduce eco-friendly driven vehicle. The principle required in making such vehicle is converting the energy produced by the human into the energy which is required to drive/ride the vehicle.*

KEYWORDS - *Renewable source of energy, Human powered vehicle, treadmill, belt, gears.*

1. INTRODUCTION

As the name suggest Human Powered Vehicle (HPV), the vehicle is powered with help of human power. The human powered vehicle is simple, compact, easy to handle and easily repairable. To give it desired strength, non-polluting and to cause less wastage, the human powered vehicle is almost metallic. It has a treadmill which gives a platform to the user. As soon as the human starts walking, the HPV starts moving ahead. Brakes are provided to stop or slow the speed of vehicle. The speed of vehicle completely depend on the effort applied by the user. A horn, headlight is also provided for safety. The ground clearance provided is good enough to provide stability and make sure the vehicle can be easily moved from any pit or stone. Gears and rollers are used for the transmission of power. A chassis is been used to mount all the parts on it and helps provide rigidity. For turning of vehicle a handle is provided and can be adjusted according to the height of the user.

The vehicle has multiple uses such as they can fulfil the basic work of treadmill for exercise as well as they can be utilized for inspection purposes in an industry. As we know that, all inspection vehicles which is utilized in industry are electrically powered but during long power cut such vehicles are useless but in our vehicle there is no need of any external power supply. Another advantage is we can generate electricity from this vehicle for devices consuming less charge i.e. we can charge battery of our mobile phones. By using this project we can do grass cuttings in many lawns.

2. LITERATURE SURVEY

This paper is based on 4 wheeler. By analysing, previous research paper. We design our project which is better in ergonomics, easy to use and more innovative. While designing we also take the care of problems and issue which are facing in below mentioned research paper for the betterment of our project and its usability.

Swarnim Shrishti (2014), [1] claimed in that this project is to build a suitable mode of transportation which would utilize human energy in an efficient way to be used for driving the vehicle such as it runs faster than the present day human powered vehicles. For this purpose the human strength and weakness, the aerodynamic effect of the fairing, the effectiveness of the drive train etc. are taken into consideration. Structural and weight analysis were performed to select the right material for the frame so as to build a vehicle which would be very lightweight but strong enough to sustain high loads exerted by the driver during a ride. The project is based on Human Powered Tricycle Vehicle.

Abhilash S.(2014) [2] has described in his paper that the Human Powered Vehicles (HPV) are aerodynamic, highly engineered vehicles that may be for use on land, in the water or the air. Some land-based HPV's have achieved speeds of over 60 mph. In urban markets, it can be projected as an environment-friendly alternative to a car. The modern generation is concerned about the environment and would definitely like to explore cleaner options if they are marketed properly.

Mohd Azman Abdullah, [5] has written is his paper, Human-powered vehicle (HPV) is often the only type of available transport that is underdeveloped and commonly unavailable in mass production. In many cases, it is a custom made a vehicle for recreational and only a few units are produced due to unobtainable off-the-shelf parts. This paper presents a modest design and development of a human-powered vehicle for recreational purpose. In this paper, a simple 4-wheel, recumbent type HPV with constraints of 1.0 m length of the track and 1.5 m length of wheelbase is designed, analysed and fabricated. Previously successful DFM method in the fabrication of actual size working prototype is used.

3. OBJECTIVES

- To make vehicles which is eco-friendly.
- To make sure the vehicle is safe.
- To give it good aesthetic looks and make it according to human antropometry.

4. SCOPE

- It is eco-friendly is does not use any source of power other than human power so it is more environment-friendly than hybrid or any types of vehicle.
- Cost of the product is less so it does not affect anyone's pocket and maximum population can use it.

- It can be used for fitness workout like morning walk or jogging can be done on it.
- It can be used for gardening big lawns by attaching a blade at the bottom part.
- It can be used for checking surroundings of big malls or big factories.
- It can be used to lose weight by walking/jogging on it as it serves the basic function of a treadmill also.

5. METHODOLOGY

The power from human legs is given to manual treadmill belt which is attached to big rollers on both ends. The roller on the rear part of the vehicle which is attached to rear wheels provides power to rear wheels. Power is given to rear wheels so that there is more torque provided compare to front wheels driven. There is an angle provided so that not much effort is required to run the vehicle. A 5-inch block is added to front axle so that an angle can be created. A gear is built at rear axle with 140mm and 80mm diameter with 40 and 30 teeth respectively, so gear reduction taking place. There are also rollers provided between two big rollers so that there is easy movement, a gap provided between two sets of rollers so that there is no chance of falling. The tire is used of 16-inch diameter i.e. of the cycle so that there is ease of getting up and down from the vehicle. Cycle handle is used with cycle brakes placed in starting two tires. There is horn present with a headlight which is connected to a battery so that it can be used in the regular purpose. The frame material determined is stainless steel and cast iron. The material selected is to provide balance between the various properties of strength, weight, fabrication time, material cost, and aerodynamic effects. The weight distribution of our project dictates how well it handles. So weight is distributed in the ratio of 60:40 on the rear and front wheels respectively. This provides better acceleration while driving and also better handling. Lightweight gears and bearing are selected to reduce the dynamic weight of the vehicle.

References

- [1] Swarnim Shrishti (2014), "Design and Development of a Hybrid Human Powered Vehicle", Department of Industrial design, NIT, Rourkela-769008.
- [2] Abhilash S. (December 2014), "International Journal of Engineering Sciences & Research Technology", ISSN: 2277-9655.
- [3] Matt Gerlich (2013), "Human powered vehicle challenge", Department of Mechanical Engineering, Northern Arizona University.
- [4] Dr.Alamgir A. Choudhury, "Human-Powered Energy Efficient Vehicle Design", Western Michigan University, AC 2012- 4978.
- [5]Mohd Azman Abdullah "Design and Fabrication of a Recreational Human-Powered Vehicle", Faculty of Mechanical Engineering, Universiti Teknikal Malaysia Melaka.

