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Fabrication of Cross Trainer with Bicycle

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Abstract: ***The construction of a cross trainer with a bicycle is the subject of this study. We employ the same approach for shorter distances by using the cross trainer as an exercise machine that allows us to run and walk at the same time. By the idea of a cross trainer, the motion of the machine is produced by transferring human energy to the machine. This device can be utilized by people for exercise as well as for shorter distance transport. It is unnecessary to set up a specific time for their exercise when using this equipment. The movement of the machine is controlled by the same action as on the cross trainer. The machine advances as we (the operator) walk by utilizing the chains.An training machine that combines the low-impact elliptical action with the pedaling motion of a stationary bicycle is a cross trainer with a bicycle function. This is a thorough workout that works the upper and lower bodies. It is appropriate for persons who wish to increase their cardiovascular fitness, lose weight, and tone their muscles because it offers a wide range of motion and muscle activation. It is a common option for folks looking for a low-impact and effective workout and is available in gyms, fitness facilities, as well as some houses.***

Keywords: Elliptical Bicycle, Short Distance , Exercise Machine

I. INTRODUCTION

A bicycle is a single-track, pedal-powered, human-powered vehicle with two wheels mounted to a frame, one in behind of the other. Karl von Drais, a German aristocrat who created the "running machine" in 1817, is credited with creating the first bicycle. With the development of the chain drive in the 1860s, the design was enhanced to allow for increased efficiency and speed. Since then, bicycles have gained popularity as a means of transportation, entertainment, and sport.Elliptical trainers are, and have been for a long time, a very versatile and well-liked piece of fitness equipment. They enable one to perform full-body cardiac workout without subjecting their muscles and joints to undue stress. As a result, users who prefer a low-impact or high-intensity workout benefit from this piece of equipment.By creating the low effort run cycle, high performance can be achieved with little effort. This bike is more stable than it appears to be and is simple to ride. Equivalent balance is needed to ride this kind of cycle as it is to pedal a standard cycle.

II. PROBLEM DEFENIATION

Treadmill is no longer used to move farm equipment; instead, it is a useful exercise alternative for issues like bad weather, a busy schedule, and physical limitations brought on by crowded areas, busy streets, and congested areas. To reduce fuel and environmental pollution, people use cars, bikes, and other vehicles frequently in daily life. Persons can utilize a treadmill bicycle if their commute is less than 5-7 kilometers. We use the roller bearings to slide the pedal from one point to another point in the bicycle.

III. METHODOLOGY

This paragraph describes about the methodology of elliptical bicycle with cross trainer.The fabrication steps for an elliptical trainer with a bicycle can vary depending on the specific design and materials being used.:

To create an elliptical trainer with a bicycle, you will need a bicycle frame, a set of elliptical handles, a set of elliptical foot pedals, and any other necessary hardware or components. Remove the wheels, chain, and any other components that will not be used in the final product. The design, you may need to modify the bicycle frame to accommodate the elliptical handles and foot pedals. This may involve cutting and welding metal, or attaching brackets to the frame. Attach the elliptical handles secure the elliptical handles to the modified bicycle frame using bolts or welding.

1) First of all take a bicycle and remove its flywheel and attach it to its back side upper portion of a rare wheel, by the help of welding
2) Taking two long pipes and attaching then on both sides of the cycle for support and add different types of bearings in it like slider contact bearings rolling contact bearings and we add the Dynamo meter to the bicycle.

3) By placing the bicycle in double stand and the human pedaling the cycle then the time wheel rotates certain rpm then the tire is connected to the dynamo meter.

4) Here the mechanical energy is converted into the electrical energy by the help of Dynamo meter and this electrical energy is stored in a battery Thus, the stored power can be used in our day to day life to charge the mobile phones.

IV. FABRICATION

This is describes about the fabrication of cross trainer with bicycle:

Figure1. Fabriication phase-I started

The above figure shows the commencement of fabrication phase-I which includes bending of pipes, arc welding of basics joints while taking care of distortion caused during welding.

Figure2. Connection of the dynamo meter

The above figure shows the connection of the dynamo meter with the cycle which is mechanical energy to the electrical energy that energy we use general applications like to charge the phones etc.

Figure3. Final look of ellipti move after completion of fabrication phase-II

The above figure shows the final look of Ellipti Move after the completion of fabrication phase –II which included assembly of all the essential components and a custom paint job.

After the real model was created, it was tested under various ambient conditions, loads, and road conditions to find any flaws or imperfections.Eventually, no problems or errors were found throughout the design or manufacture procedures. In order to evaluate how the bicycle would act under the aforementioned road conditions, the model was tested on smooth, bumpy, dirt, and uneven road surfaces. Fortunately, the bicycle performed well, removing any potential for unbalance.

V. ADVANTAGES

These are the different types of advantages of cross trainer with bicycle:

1) *Minimal Impact:* A gentle, elliptical action on the knees, hips, ankles, and back results in a fantastic workout.
2) *Comfortable:* The "stand up" riding position relieves seat soreness and puts less strain on your back and neck.
3) *Heart-Healthy:* Provides a better workout in less time and burns 33% more calories than a standard bicycle.
4) *Outside:* Intended for use on the same outside route as walking, jogging, running, or bicycling, but also compatible with indoor stationary trainers (3C/8C/11R only), allowing year-round training.
5) *Better Visibility:* Riding in a higher posture makes it simpler to see and be noticed.
6) *One-Size Fits All:* All steering angles and pedal strokes are movable, allowing riders between the heights of 4'10" and 6'10" to find the perfect fit for a pleasant ride.
7) *Excellent Full-Body Workout:* Elliptical bikes' stand-up position works your core and upper body in addition to your legs.Weight-bearing exercise increases bone density, raises heart rate, and burns calories.
8) *Portable:* Fits inside the majority of cars and may be mounted on a variety of roof, trunk, and hitch racks.

VI. LIMITATIONS

Elliptical cross-trainers, commonly referred to as elliptical bikes or elliptical machines, are a type of workout apparatus that combines the low-impact motion of an elliptical machine with the outside experience of riding. There are certain drawbacks to utilizing an elliptical bicycle alongside a bicycle, despite the fact that they provide various advantages, such as a full-body workout and decreased joint stress, including:

1) *Discreet Terrain:* Elliptical bicycles are made to be used on smooth, flat terrain like roads or bike trails. The types of terrain you can explore are limited because they are not appropriate for off-road or mountain biking.
2) *Restricted Speed:* Compared to most standard bicycles, elliptical bicycles typically have a top speed of only 15 to 20 miles per hour. This makes it difficult to keep up with other cyclists or to cover long distances quickly.
3) Reduced Maneuvrability: Due to the unique motion that elliptical bicycles are created for, they might not be as maneuvrable as regular bicycles. To manoeuvre through traffic or make tight turns may be more difficult as a result.
4) *Limited use:* Elliptical bikes can be used for transportation or exercise, but their use is constrained by inclement weather because they are typically unsafe to use while it's raining or snowing.
5) *Limited Storage:* Elliptical bicycles might be more difficult to store and transport because they are often heavier and bulkier than conventional bicycles.
6) *Restricted Accessibility:* Those with some mobility problems or disabilities might not be able to use elliptical bicycles since they need a particular range of motion to function properly.

VII. APPLICATIONS

A cross trainer with a bicycle is a versatile piece of fitness equipment that combines the motion of a traditional elliptical trainer with the added challenge of cycling. Here are some of the potential applications of a cross trainer with a bicycle:

1) *Cardiovascular Exercise:* Using a cross trainer with a bike will provide you a hard cardiovascular workout that will help you become more physically fit overall.
2) *Weight Reduction:* You may burn a lot of calories by combining the motion of a cross trainer with that of a bicycle, which can help with weight loss.
3) *Low-Impact Exercise:* The cross trainer with a bicycle is an exercise machine that is excellent for people who have joint pain or injuries because it is low-impact.
4) *Interval Training:* The cross trainer with a bicycle is a great tool for interval training since it allows you to alternate between an elliptical and cycling motion. Your level of fitness can be raised quite effectively with interval training.

5) *Training For Particular Sports:* You can use the cross trainer that has a bicycle to train for activities like cycling, skiing, or jogging. You can enhance your performance and lower your chance of injury by replicating the movements of these activities.

VIII. CALCULATION

The cross trainer is with minimal impact on the joints, the elliptical trainer is a stationary workout machine that may be used to simulate stair climbing, walking, or running. The average person may exercise on an elliptical machine for 30 minutes at a moderate effort and burn between 175 and 225 calories. Weight, the intensity of the exercise, and the length of the session all affect how many calories are burned.

The elliptical METs are influenced by the level of effort.

The METs are influenced by the level of effort.

1) Calories expended during exercising = time in minutes x MET x 3.5 x weight in kg / 200
2) Calories expended per hour of activity is 200 divided by 60 times MET x 3.5 x weight in kg. The metabolic equivalent of task (MET) is a measurement of the amount of energy required to sustain a physical activity over time. The Compendium of Physical Activities, which is cited in the sources section, presents mean MET values.
3) A MET of 1 is the energy required for a person to sit stationary at room temperature without actively digesting meals. According to the chart below, a MET of 2 requires twice as much energy as a MET of 5, and so on.

Table-1: Elliptical METs depended on the workout

Exercise intensity	Elliptical resistance setting	Effort MET
Low 2	Light	4.6
Mid 5	Moderate	4.9
High 8	Vigorous	5.7

4) In the first attempt the Dynamo meter output was recorded at 5V.
5) In the second attempt the Dynamo meter output was recorded at 6V .
6) In the rare wheel , the attached Dynamo meter gets output of 6V power.
7) The voltage and output power of Dynamo meter is relevance on the speed of pedaling and load of the circuit.

IX. RESULTS

Elliptical machines, commonly referred to as cross trainers, are common workout devices found in homes and gyms all over the world. A cross trainer is a low-impact choice for cardio training since it mimics the motion of jogging or walking without the strain on joints. By the idea of a cross trainer, the motion of the machine is produced by transferring human energy to the machine. This device can be useful for people to use for fitness as well as short-distance transport. It is unnecessary to set up a specific time for their exercise when using this equipment.

The bicycle's rear wheel has a dynamo metre attached to it that is connected to a battery and When the bicycle is mounted on two stands and you pedal, the rear wheel revolves at a set rpm. Electrical energy is created by converting mechanical energy into it, and batteries may store electrical energy. We can use the saved energy for household tasks.

X. CONCLUSIONS

We can therefore conclude that Ellipti Move is produced. Cost optimization, which is successfully completed with the added benefit of exposing this concept to the Indian market, results in 60% cost optimization, which satisfies our project's goal of producing and manufacturing the model.Many chores can be accomplished rapidly on the elliptical bike. The elliptical bicycle is entirely hand-operated. People can increase their workout with elliptical bikes. As it doesn't use biological fuels, the elliptical bicycle is especially eco-friendly. An elliptical bicycle does not promote pollution in any way. Anyone can use this bicycle for both short-distance travel and exercise. When utilising an elliptical bicycle, there is no need to schedule a specific time for their workout. Ellipti Move gives riders a workout while reducing the impact on their joints that comes from exercising on a treadmill, elliptical machine, or while jogging or cycling. Because of the more comfortable Ellipti Move's design, the rider can exercise without experiencing the pain that persistent riding causes.

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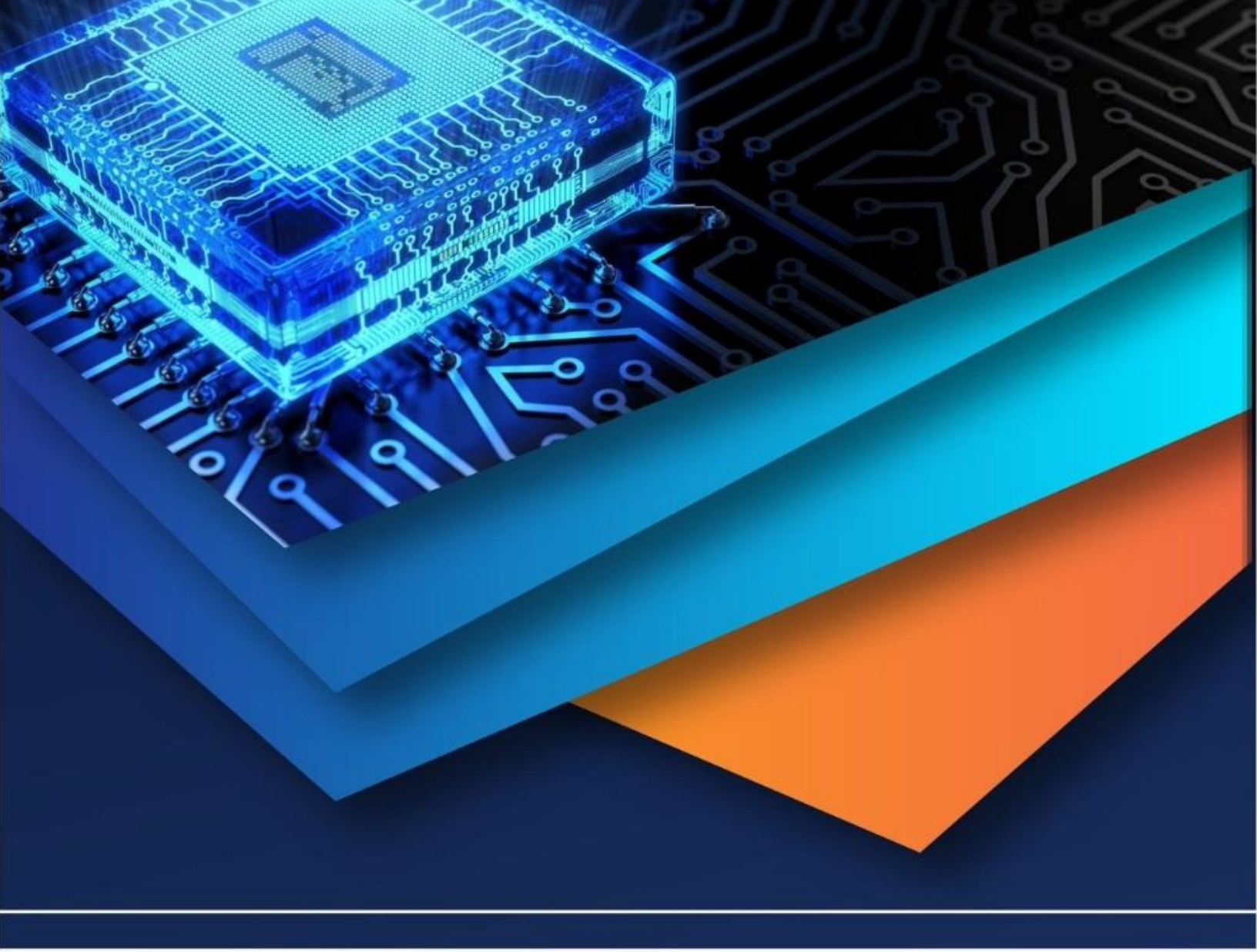

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