



DEVELOPMENT AND FABRICATION OF TREADMILL BICYCLE

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Abstract: The treadmill bicycle represents an innovative device that merges traditional exercise equipment with a transportation mechanism. It works on the idea of transforming forward momentum from motion of humans without the use of electricity. This combines a bicycle frame with a treadmill platform such that when a person walks on the treadmill, the action goes backward and the bicycle moves forward via a chain system. By harnessing kinetic energy from the user's physical effort, it eliminates the need for external power sources or electrical assistance. This unique combination promotes health and lessens dependency on fossil fuels while providing an environmentally friendly, independent, and effective means to commute or work out. It even gives off an innovative perspective on transportation. The treadmill bicycle is an innovative and sustainable way to move and keep active without relying on electricity or other external power sources. It represents the merging of exercise and mobility.

Index Terms – Treadmill, Bicycle, Roller

I. INTRODUCTION

The bicycle treadmill provides a novel way to work out while moving. In contrast to conventional bicycles, it has a treadmill—a well-known fitness device renowned for its efficiency and ease of use. A treadmill belt is integrated between the bicycle's front and rear wheels[1]. The treadmill bicycle is unique as it uses a gear mechanism[4][1]. This device establishes a well-designed connection between the conveyor belt and the bicycle's wheels. The movement of the belt drives the gear rotates, which in turn drives the bicycle's rear wheel and the user runs or walks on the treadmill[1].

This inventive solution addresses the challenges associated with short-distance travel, particularly the reliance on commercial vehicles that contribute to pollution and fuel consumption[6]. By merging the benefits of exercise with transportation, the treadmill bicycle presents a sustainable alternative for urban commuting and local travel. It offers individuals the opportunity to engage in physical activity while reducing their carbon footprint and dependence on motorized vehicles[3]. Additionally, the treadmill bicycle promotes a healthier lifestyle by seamlessly integrating exercise into daily routines.[3]

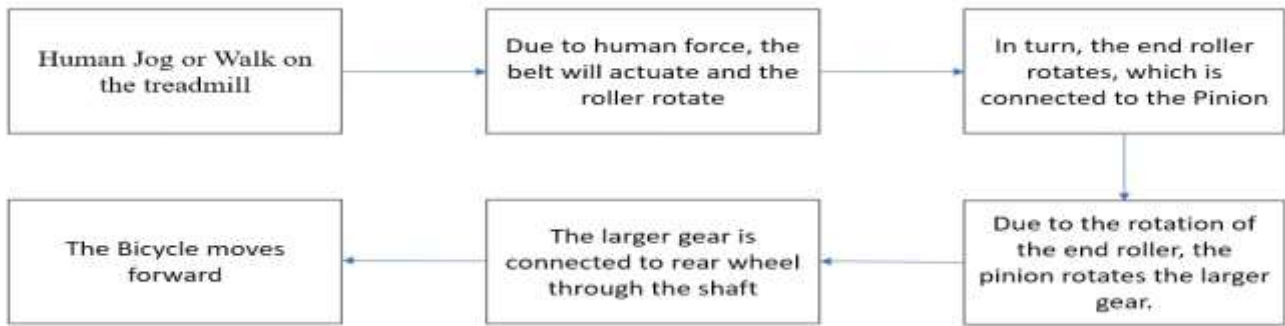


Figure 1 - Working Principle

Additionally, the addition of wheels to the treadmill design improves its use and mobility, making it useful for navigating a variety of urban and topographical conditions. The treadmill bicycle is a versatile and functional mode of transportation, whether it is used for short errands or for leisurely rides around the neighbourhood. Its ecologically friendly design is in line with the increasing focus that contemporary society is placing on sustainability and eco-friendly activities[3]. Essentially, the treadmill bicycle is a symbol of the fusion of exercise and mobility, opening the door to a more environmentally friendly and healthful future[1].

II. PROBLEM STATEMENT

In day-to-day life, the people mostly use cars, bikes, etc. to travel which results in increase in pollution and as we know pollution is a big problem nowadays. Pollution isn't good for our environment, and it's something we need to find solutions for.

Now, when people go to the gym to stay healthy, they use treadmills for jogging and running. The trouble with regular treadmills is that they stay in one place. Running on them can feel a bit dull because you're not moving through different surroundings, and you miss out on the fresh air outside. So, here's where the idea of a Treadmill Bicycle comes in. It's like combining a bicycle and a treadmill to create something cool and helpful. This special treadmill isn't stuck in one spot – it moves with you! Imagine riding a bike, but instead of moving on the road, you're also running on a treadmill. This way, you can travel from one place to another, just like with a bike, but without causing pollution. It's like getting two benefits in one – you're staying fit and reducing pollution at the same time. This Treadmill Bicycle is a smart solution. You get to enjoy the outdoors, breathe in fresh air, and stay healthy while you travel.

III. OBJECTIVES

The objectives of the project are:

- To develop the treadmill cycle to be lightweight and easily transportable.
- To Promote Eco-Friendly Transportation and lowering carbon emissions.
- To develop the treadmill cycle to provide an effective cardiovascular workout, contributing to better heart health and overall fitness.

IV. METHODOLOGY

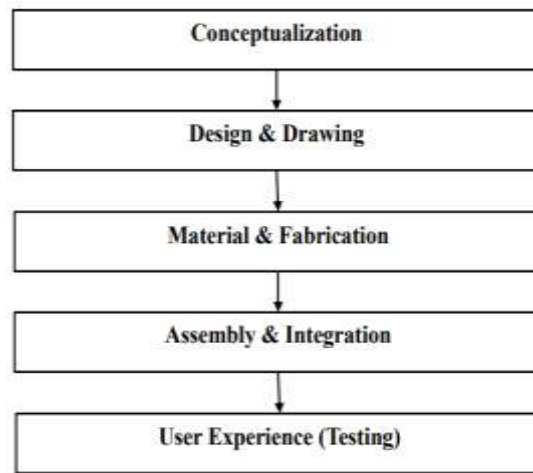


Figure 2 - Methodology

4.1 Conceptualization:

The treadmill bicycle merges cycling and treadmill technology, offering a dynamic workout that combines cardiovascular benefits with targeted leg strength training. Its compact design simplifies exercise routines, bridging the gap between cycling and treadmill workouts. Versatile and engaging, it provides a unique warm-up and diverse workout options. In conceptualization, it promises an integrated and enjoyable fitness solution for daily routines, emphasizing holistic well-being.

4.2 Design and Drawing:

The treadmill bicycle's design prioritizes stability, durability, and user comfort. Its robust frame, adjustable seat, and handlebars cater to diverse users, while large wheels beneath drive the treadmill belt as users pedal, blending cycling and treadmill functionalities seamlessly. A user-friendly control panel allows customization of speed and workout metrics. Collapsible elements optimize space and enhance portability, making it an ideal fitness companion for compact living spaces, merging form and function effortlessly.

4.3 Material and Fabrication

Material selection and fabrication are vital in realizing the treadmill bicycle. The frame, crafted from lightweight materials like aluminum or steel, balances stability and maneuverability. High-quality, non-slip rubber forms the treadmill belt, ensuring durability and efficiency. Rotating wheels made from reinforced plastic or lightweight alloys drive the belt smoothly. Adjustable seat and handlebars prioritize user comfort, while a durable plastic control panel enhances interaction, highlighting a commitment to quality and user-centric design.

4.4 Assembly and Integration

Assembly is pivotal in realizing the treadmill bicycle, transitioning from concept to functional fitness equipment. This process involves connecting frame components, securing the durable treadmill belt, and installing rotating wheels. Safety mechanisms, including brakes, are integrated for secure operation. The result is a compact, fully functional treadmill bicycle ready to provide dynamic workouts. This phase ensures seamless integration of components, guaranteeing reliability and effectiveness in fitness solutions.

4.5 User Experience

Testing validates the treadmill bicycle's adherence to high standards. Comprehensive checks ensure seamless integration of components, smooth operation of moving parts, and user-friendly adjustable features like the seat and handlebars. The control panel undergoes rigorous testing for ease of use and accuracy. Material strength and safety features, including emergency stops, are scrutinized to ensure durability and user safety. Real-world scenarios validate its functionality, safety, and satisfaction, affirming its reliability as an innovative fitness solution.

V. COMPONENTS AND DESCRIPTION

The major components that are involved in the fabrication of the treadmill cycle are:

5.1 Main Frame



Figure 3 – Main Frame

The main part of the Treadmill Bicycle is made from mild steel and is very important for how it works. It's built with materials that are strong but not too heavy, so it can handle all the moving around while also keeping users safe and comfortable. We use strong steel to make sure it's tough enough for walking and running, but still easy for people to use. Apart from holding everything together, like the handlebars and the treadmill belt, the frame is also made carefully to make sure it's safe and lasts a long time. We use special techniques to join everything together properly, like welding or bonding, to make sure it's all secure.

5.2 Conveyor Belt



Figure 4 – Conveyor Belt

The conveyor belt in the Treadmill Bicycle is made of rubber and plays a key role in turning the movement from walking/running into forward motion. It's designed to feel like jogging or running outdoors and can handle the impact of your feet as you walk or run. The belt is strong and lasts a long time, giving you a smooth and consistent workout experience. By using the conveyor belt, the Treadmill Bicycle not only improves your heart health but also lets you do different types of exercises for a full-body workout.

5.3 Rollers and Pillow block



Figure 5 – Rollers and Pillow Block

In the Treadmill Bicycle, the collaboration between Rollers and Pillow Block is crucial for smooth operation. Rollers, placed along the conveyor belt, help it move smoothly while Pillow Blocks reduce friction, ensuring efficient energy transfer. These Pillow Blocks also reduce resistance, making walking feel more natural and preventing damage to the system. Together, they create a smooth experience for users, making walking or running on the treadmill comfortable and efficient. This teamwork between Rollers and Pillow Blocks not only improves the user's workout but also makes the Treadmill Bicycle more durable and efficient.

5.4 Wheel



Figure 6 – Wheel

Wheels play a crucial role in the Treadmill Bicycle, making it easy to move around and steer. Both the front and rear wheels are chosen for smooth movement on different surfaces, ensuring a comfortable experience for users. The front wheel allows for steering, making it simple to control the direction with stability. Meanwhile, the rear wheels support the weight of the Treadmill Bicycle and help keep it aligned during use. With wheels included, the Treadmill Bicycle becomes a versatile fitness option that can be easily transported and used in various places like homes, gyms, or outdoors, adding convenience and accessibility to its appeal as a portable fitness device.

5.5 Gear Mechanism



Figure 7 – Gear

In this setup, the energy from the user's movement is transferred to the treadmill's roller through gears. There's a big gear on the bicycle wheel shaft and a smaller one on the treadmill roller. With a gear ratio of 4:1, for every turn of the big gear, the small one turns four times, speeding up the treadmill belt. As users walk, this gear system translates their effort into movement, providing a thorough cardiovascular workout. This efficient mechanism ensures a smooth exercise experience, helping users reach their fitness goals effectively.

VI. 3D MODEL



Figure 8 – Assembled Treadmill Bicycle

VII. FABRICATED MODEL



Figure 9 – Fabricated Model

VIII. FUTURE SCOPE

The treadmill bicycle brings a fresh approach to travel using gears. Its inclined walking platform enhances the torque of the bicycle. User move the bicycle by walking, with gears making them faster. This idea not only encourages exercise but also tackles health issues like obesity and breathing problems. Using this bike regularly for short trips can greatly benefit health, especially as fuel prices rise.

Furthermore, the treadmill bike is suitable for people of all ages, presenting a hopeful option for upcoming journeys. As fuel becomes more expensive and scarcer, this bike emerges as a feasible substitute, providing various advantages to society. It can be labeled as an eco-friendly mode of transport, aiding in decreasing pollution, a major environmental concern. Additionally, it provides a delightful exercise experience, encouraging ongoing motivation for improved performance. Moreover, it streamlines exercise, essential for fitness, thus cutting down on the time usually allocated for separate workout sessions.

IX. CONCLUSION

The treadmill bicycle is a great way to exercise and get around outdoors by running or walking. It's good for the environment because it doesn't need fuel, so it doesn't create pollution. Even though it's simple, it can still be made even better in the future. Its main goal is to encourage using bikes as a renewable energy source to help protect the environment. Plus, it's designed to give a good workout for our heart and fitness overall. With its ability to exercise and help the environment, the treadmill bicycle is a great choice for people who love to exercise and care about the planet.

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