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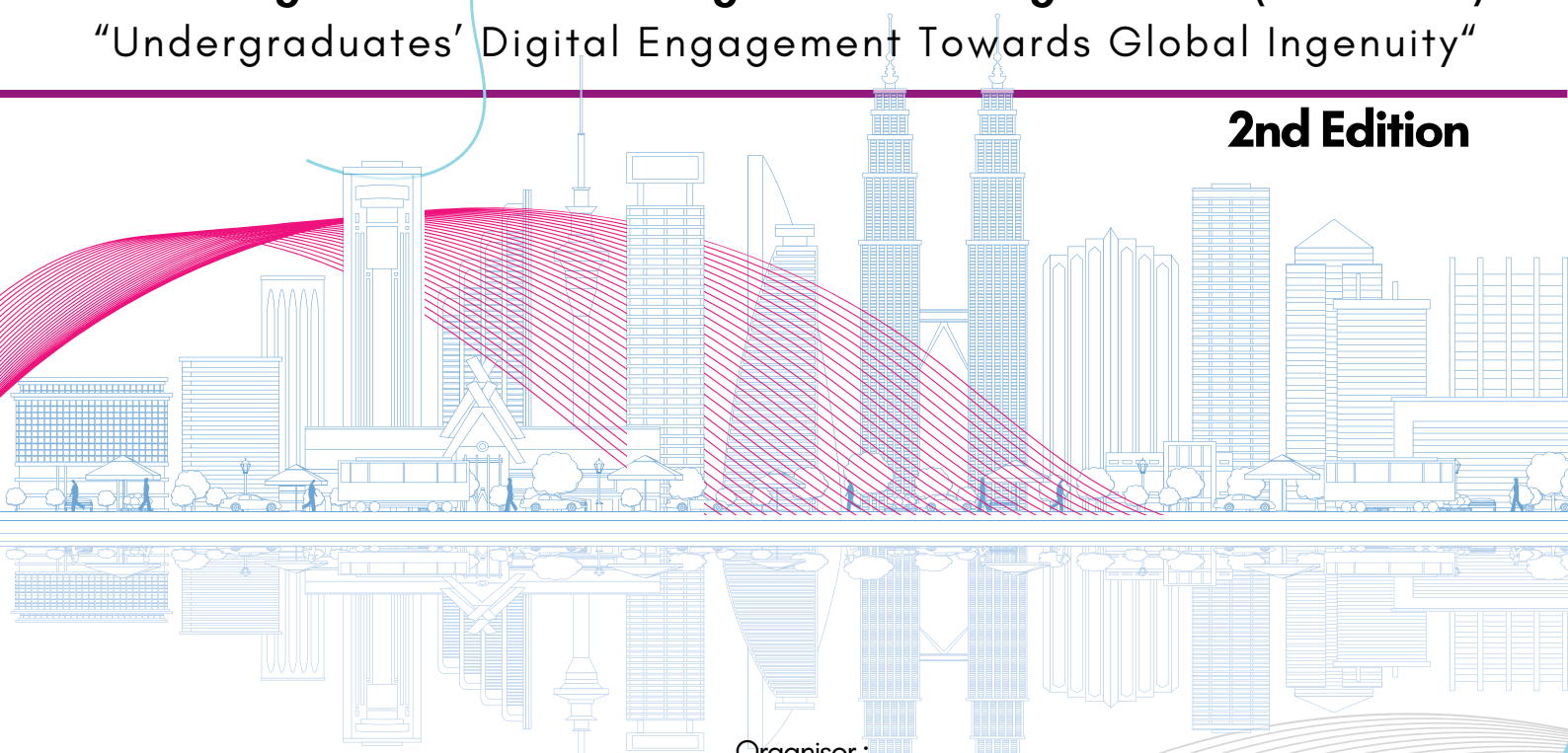
"Undergraduates' Digital Engagement Towards Global Ingenuity"

2nd Edition



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FLEXIBLE SPIRAL BICYCLE WHEEL

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Abstract
Bicycles are the greatest invention of all humankind. It helps man to transport everywhere by using their own energy. A bicycle is a two-wheeled vehicle that cyclists sit on and move by turning the two pedals. Unfortunately, even though each bicycle wheel comes with a tough rubber tire, not all cyclists feel comfortable over terrains. To provide more comfort when confronting multiple surfaces, bicycle wheels should be altered to make them function like a suspension while maintaining grips. The universality of the altered bicycle wheels is also important as it can be used by different types of bicycles. Through delving deep into information research, simulations and understanding videos about bicycle physics and concepts, the result led to the possibility of adjusting the wheels to unique features as it provides support for the frame and is able to work like the original bicycle wheel. Overall, the comfort of bicycle riding is important to cyclists to experience optimum riding experience and a healthy life. With the innovation of 'Flexible Spiral Bicycle Wheel,' the existing suspension in the wheel can attract more customers to only purchase the wheels.

Keywords: *Spiral, Bicycle, Wheel, Comfort, Universal*

1. INTRODUCTION

The purpose of this research is to develop bicycle wheels that offer comfort to the bicycle user whenever surfaces they cycle through, while at the same time maintaining the exact or better grips on the ground, allowing the bicycle users to transfer maximum force to move the bicycle. According to Big Momma's Bicycle (2023) punctures can be caused by sharp objects on the road or by poor tire maintenance. Bicycle users or cyclists often encounter problems with maintaining a smooth ride. Findings from Richard (2012) indicated that the spoke tension is particularly high, especially on the non-drive side of the rear wheel, even though Mavic uses 'Isopulse' radial lacing to balance the tension with the drive-side spokes. Riding on multiple terrain, regardless of the type of bicycle is unable to ensure a smooth riding because of the dependency on external suspension. External suspensions are designed to give comfort, which is like the current innovation, but they are not universal. Hence, they require proper adjustments to make them functional while riding. Another fact is that different types of bicycles will determine whether they deserve a suspension or not. Our innovation aims to fulfil the needs of all bicycle riders regardless of the shape and design of the bicycles.

This qualitative research employs methods of gathering all available data and information related to bicycle wheels. Analyses of literature and simulations were also conducted to help redesign the bicycle wheel. The main finding of our research has shown that it is possible to create a new and innovative kind of bicycle wheel. This innovation is similar to normal bicycle wheel shape, but it is formed with multiple layers of tough elastic metal, in spiral shape, built with bicycle wheel tire covers (equipped with hooks that keep them in place all together).

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2. MATERIALS AND METHODS

The method was done qualitatively, where information and data were gathered to help in providing the design of our innovation and the materials used are compatible with the purpose of our research. As stated by Green (2021), due to a distinctive feature of the material, the tires can reorganize their molecular structure when subjected to mechanical strain, a remarkable property known as 'super elasticity'.

The following are the rough sketch, and the concept design of our innovation, which will lead to considerations in making the best selection, to create a fusion of flexible spiral bicycle wheels. Before that, there are certain rules to ensure the innovation is up to its best quality:

- Each spiral bar is made of tough alloy, such as titanium.
- Each edge of edge bars requires hook-alike structure.
- The purpose of the hook structure is to:
    - attach the tyre cover attachment.
    - attach, link, align, or at least not cause any disruptions.
    - ensure each spiral bar is at their places.

Figure 1.0 and Figure 1.1 illustrate the rough sketches of the innovative design.

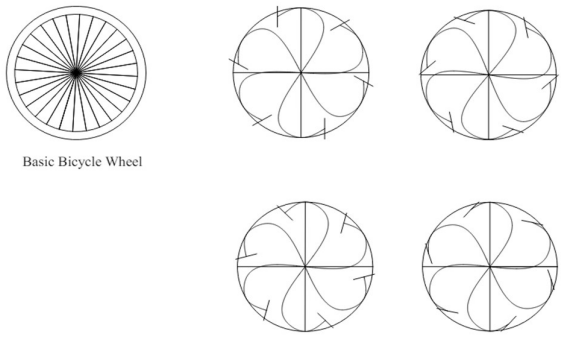

Figure 1.0 Innovation of Flexible Bicycle Wheel concept designed by Nurul Ain Binti Zainuddin using AutoCAD.

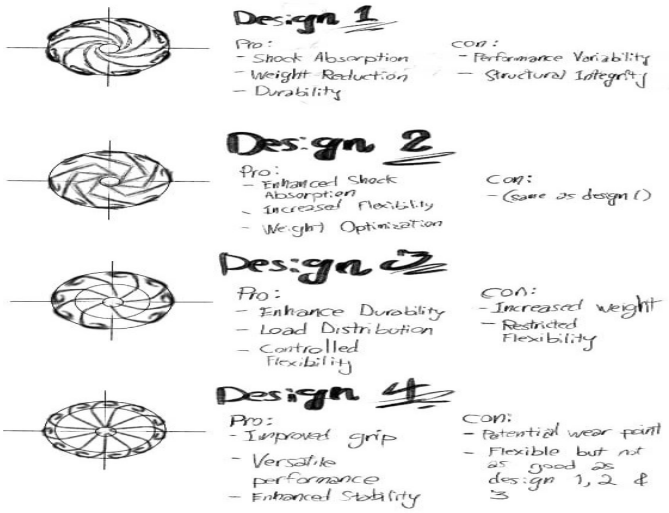

Figure 1.1 Innovation of Flexible Bicycle Wheel concept by Muhammad Salahuddin Ayubi Bin Rosnelizaide using digital art programme, Sketchbook.

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3. RESULT AND DISCUSSION

Drawing from the findings of the two sketches (Figure 1.0 and Figure 1.1) the final design of the innovative design is illustrated in Figure 1.2:

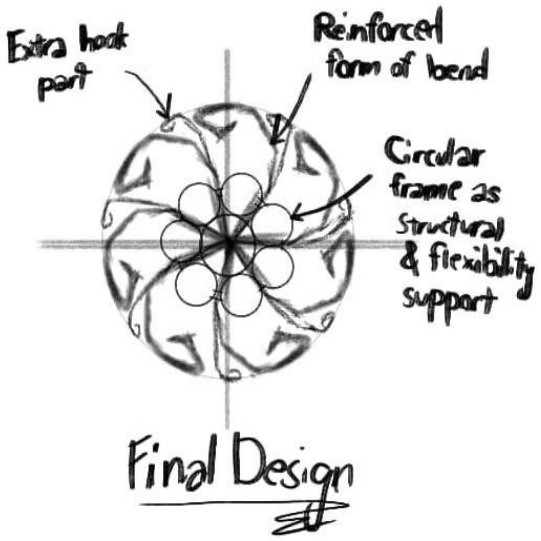

Figure 1.2 Final design of Flexible Bicycle Wheel

Britannica (2024) stated that a wheel, particularly the tire, is the crucial connection between the bicycle and the ground. The final design is intended for efficiency, safety, and comfort because the wheels serve as a suspension alike. Extra hook parts were added to ensure the bars stay in place and to avoid any potential dirt or stain caught on the wheel while riding. The shapes of tough, blended flexible bars inspired by the design in Figure 1.1 is to be able to optimize weight and to enhance shock absorption to the maximum limit. The circular frames have two impetus - as structural and flexible support, preventing the bars from being too dependent on itself while on pressure and averting deformation for long and rough usage.

4. CONCLUSION

In conclusion, developing the bicycle wheel with titanium can be a rewarding project, as the wheels offer durable, light, and sleek aesthetic look. Beginning with designing our bike frame, we consider factors like geometry, intended road-type usage, height of mountains, types of touring, and body measurements for a comfortable fit. Softwares and AutoCAD sketches were used to map out the design.

Moreover, the chosen materials and tools must be of high-quality titanium tubes and other necessary materials such as welding rods, dropouts and bottom brackets. In addition, for component selection, compatible components such as wheels, drivetrain, brakes and handlebars must match the frame design and the intended use. This opts for high quality components that complement the lightweight and durable nature of titanium.

Next, for the final touch once it is fully assembled, the bike is given a thorough inspection by smoothing out any rough edges or welds and applying a protective coat to prevent corrosion and enhance the bicycle's appearance. Testing and adjustment are important before hitting the road or trail and this is done by taking the bicycle on a test ride in a safe environment. Any necessary adjustments will be made after the test ride to ensure proper fit and performance.

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As we continue to explore the intersection of technology, sustainability, and individual expression, bike wheel innovation stands as a testament to the power of human creativity in shaping the future of mobility.

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