Air Spinning

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Problem

The smell in the gym is often very unpleasant due to the stink of sweat and the air quality in China is also worrying. Although air freshener can improve the situation, it may lead to allergy or dizziness because it contains chemical fragrances. This project aims to purify the air in the gym with filters by utilizing the power generated by spinning bikes and we also want to improve the user experience of spinning bikes by adding heart rate monitor, odometer and display screen.

Needs

First, we need a filtration system that utilizes the power generated by the spinning bikes to purify the air. We also want to combine the tradition method of using filters with the anion method to improve the efficiency of our product. Second, we want to improve the user experience of the spinning bike by adding heart rate monitor, odometer and display screen and we want all the electronic parts to be controlled by Arduino Uno.

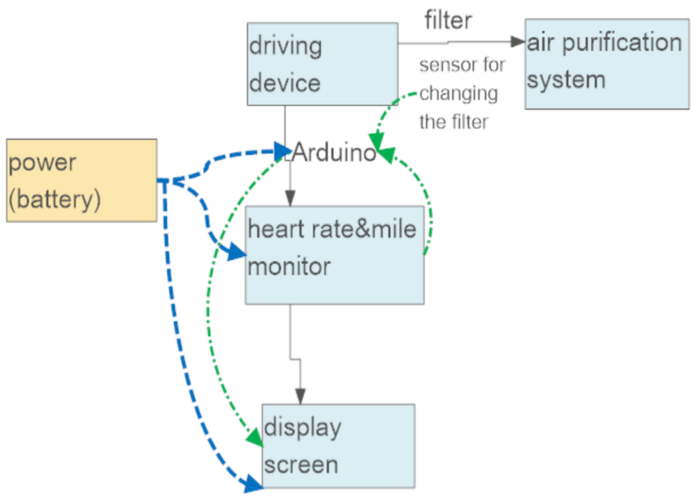

Fig.1 Block Diagram

Solution

Our design is based on a common manufactured exercising spinning bicycle, which is able to be adjusted to provide comfortable exercising experience. The front part is a flat-snail-shaped filtration shell. The inner Of the filtration shell consists of a central shaft, a set of fan blades, a series of filtration layers and a negative ion generator. The shaft is driven by the spinning of the bicycle pedals through a system of belt transmission which allows the shell fans to spin, take in room air from the opening on the shell, filtrate it and exhaust when people ride the spinning bicycle. A heart rate sensor is placed in a nylon ring and a round counting sensor is placed on the pedal shaft, the input of the two sensors are transmitted to the Arduino board and displayed on a digital number display board on the headstock.

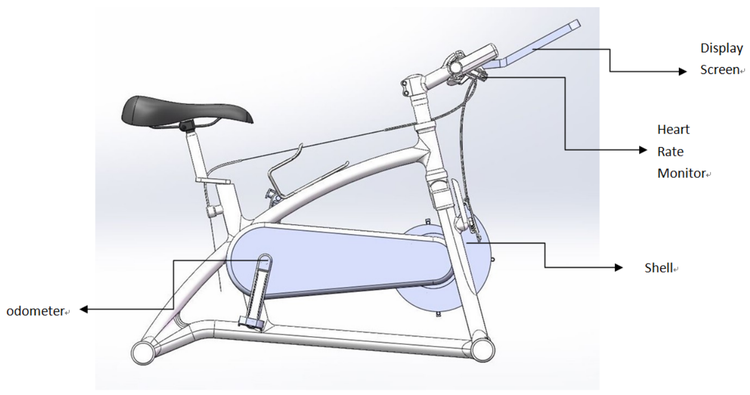

Fig.2 Concept Diagram

Objectives

In order to achieve the goal of filtrating the indoor air by riding exercising spinning bicycle, our product is expected to be able to:

- Provide half-confined environment for air filtration.
- Create air flow utilizing the power of rotating bicycle.
- Eliminating pollutants and small particles in the air through certain process.
- Provide basic exercising condition monitoring and displaying including heart rates and riding speed for the users' goodness of efficient exercising.
- Modify the structure of the Spinning bike to provide open space for air filtration.

Tasks

Our team have fulfilled the following tasks so as to meet the objectives raised:

- Design and 3D print a volute-shaped shell with two openings to pass through the whole structure.
- Applying a structure of whirl plate driven by the rotating of the bicycle pedals so that the air can flow in from the opening side of the shell.

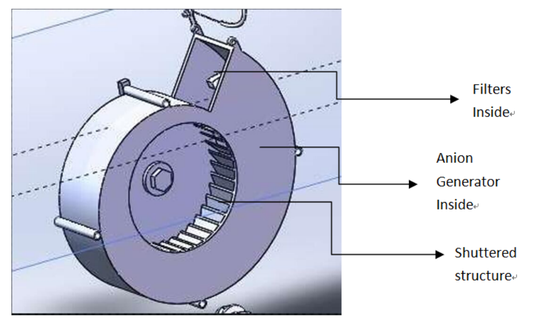

Fig.3 Filtration Part

- Layers of different types of filters, including Hepa filters, acticarbon filters and static electric.
- A Hall sensor is attached above the rotating shaft to compute round time and velocity. Heart beat sensor at the handle bar to detect users' heart rate. The sensors are linked to an Arduino board which send signal to 4-digit display screen to show the figures.
- Modify the front iron bars of the original and make space for the filtration system.

Conclusion

Air spinning is used for refreshing the air while people are doing exercise, especially in the gym. In order to give customers a better air condition, the air quality must be ensured to reach the standard. And the bicycle should also have other basic functions for exercising.

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