

# INNOVATIVE AIR CIRCULATING STATIONARY BICYCLE

## Climate Change Innovation: Innovative Air Circulating Stationary Bicycle

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## Background Information

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Climate change is a long-term change in the average weather patterns that have come to define Earth's local, regional and global climates (*Overview: Weather, Global Warming and climate change*, 2021). Starting the Industrial Revolution, humans started using fossil fuels like coal, oil and gas to generate energy required for the machines to function. Greenhouse gases are emitted through these reactions and these are believed to be the main cause of climate change today. Greenhouse gas wraps around the Earth and traps the sun's heat, thus raising the average temperatures on Earth (AirGradient, 2020). Carbon dioxide (CO<sub>2</sub>) is a greenhouse gas and is most commonly emitted from using gasoline for driving a car or coal for heating (AirGradient, 2020).

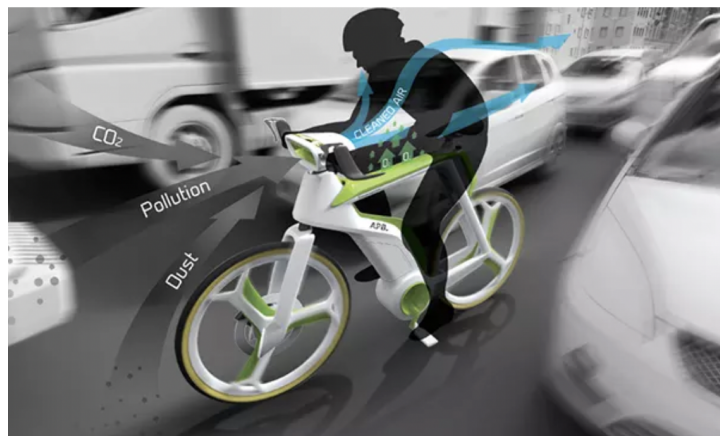
The rising CO<sub>2</sub> levels is an important topic to discuss because of its severe impacts. For instance, CO<sub>2</sub> levels in their blood rise when entered in lungs, reducing the amount of oxygen that reaches their brain (ScienceDaily, 2020). By the end of the 21st century, people are expected to be exposed to indoor CO<sub>2</sub> levels up to 1400 ppm while levels over 1000 ppm (parts per million) are considered unhealthy levels (ScienceDaily, 2020). According to a new CU Boulder-led study, the rising indoor CO<sub>2</sub> levels “may significantly reduce our basic decision-making ability and complex strategic thinking” (ScienceDaily, 2020).

## Innovation

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### Pre-existing Model

Our innovation is based on a pre-existing photosynthetic bike fabricated by designers from the Lightfog Creative & Design Company (Brownstone, 2013). This existing framework functions by filtering CO<sub>2</sub>, pollution and dust into cleaner air for the rider while producing oxygen. This bike contains an aluminum frame that runs on a “photosynthesis system” that generates oxygen through a reaction between water and electric power from a lithium-ion battery.



*Figure 1: Pre-existing “photosynthetic” bike derived from  
<https://www.fastcompany.com/3023176/photosynthesis-bike>*

The advantages of this bike is that it filters CO<sub>2</sub> and generates oxygen effectively. The main problem with this bike is it does not target the most vulnerables. We need this bike to function specifically in indoor spaces such as homes and gyms since those are the spaces we are living in every day and contain the highest amount of CO<sub>2</sub>. Although having such bicycles are amazing innovations outdoors, the problem still remains once individuals enter enclosed spaces.

### **Our model**

Our model is a combination of an indoor stationary bike and a photosynthetic bicycle (see Figure 1). One major modification is the location of its use. We focus on indoor activities as it's where the most vulnerables suffer from cognitive ability deficiency. In addition, one already receives adequate oxygen and air quality when outside. Whereas for ours, it promotes exercise and healthy air quality indoors, especially during this pandemic where outdoor activities are not encouraged.

The purpose of this bicycle is to help with air circulation, a huge dilemma that causes lack of oxygen in enclosed spaces. Gyms, houses and even educational buildings (i.e. universities) can include this to help replace the oxygen-deprived environment into a cool and fresh environment. Exercising has shown to improve cognitive functions such as memory, mood, sleep quality and concentration span (2021). As mentioned previously, the lack of oxygen in the brain leads to impairment in cognitive functions. Therefore, the oxygen produced by our bicycle helps to prevent this type of impairment.

In addition, there will be a monitor on this new model, showing the users their heart rates, blood pressure, amount of oxygen emitted and amount of CO<sub>2</sub> trapped in (in ppm levels). CO<sub>2</sub> levels will be split into parts per million groups — <500 ppm, 500-700 ppm, 700-1000 ppm, >1000 ppm. Using our model, people may exercise according to the CO<sub>2</sub> level (in ppm). We are also planning to develop an application which demonstrates data present on the monitor of the bicycle, and users can use it to select music they like for different CO<sub>2</sub> level categories.

The strongest strength of our bike is that no energy is required in the photosynthetic process. Even though there is energy required, thus greenhouse gas emitted, during the production process, this is inevitable. From different stakeholders' points of view, it is a very beneficial product. For users, it is a very nice experience using this bicycle as two purposes could be achieved at once: exercising and improving the indoor environment. Lastly, for the company producing and selling this bicycle, would it be a smart decision to promote this product especially in this dilemma combating climate change.

Weakness-wise, it is definitely not as effective when producing oxygen as the photosynthetic bicycle mentioned previously since mechanical energy generated by human activity produces less energy for the filtering of CO<sub>2</sub> and the generation of oxygen. However, this weakness is needed to encourage users to use the exercising machine more often. It will also be an expensive item as the addition of oxygen tanks and different filtering mechanisms are costly.

We believe that it is a great innovative idea as it is new. Furthermore, people all around the world are concerned with climate change today. If the promotion for this product emphasizes its help to users in health and CO<sub>2</sub> emission, it will interest many people.

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