

A cover for the single-person pedal-powered vehicle

Introduction

Traffic safety has been widely concerned with the development of urbanization and the progress of transportation industry due to its close relationship with people's lives. By 2022, the total length of roads in the world has reached 80 million kilometers, and the length of roads in developing countries is still growing at a rapid rate.[1] In parallel with this growth is the increase in the number of vehicles, of which the number of single-person pedal-powered vehicles (or called bicycles commonly) ranked second. [2] However, according to the annual report of World Transport Industry Development Organization (WTIDO) for 2022, bicycle drivers account for 86% of road deaths, which ranked first by a wide margin. [3] This huge proportion of deaths has attracted the attention of vehicle development researchers and companies and how to reduce or avoid losses of bicycle accidents has become a key issue in this field.

To reduce the loss of bicycle accidents, many schemes have been put forward. Arvin et al.[4] focused on the strength of the vehicles and proposed the use of stronger carbon fiber to make the vehicle frame. Although the vehicle itself has become hard, its protection for people is limited. James et al.[5] suggested that personal protection should be achieved by legislation which would make it mandatory for drivers to wear helmets. However, there are many countries have implemented such policies but the losses of such accidents remain high.[6,7] In the past studies, the interaction between drivers and vehicles has been ignored as the improvements of drivers and vehicles has been considered separately. In this case, we tried to combine these two aspects together to provide a more effective solution.

In this paper, we designed a cover integrated with the bicycle which can protect cyclists from injury and tested the performance of the cover by experiment. In addition, the aerodynamics properties of the cover were also examined by computer simulations. Our results reveal that the cover we designed can effectively protect the driver in an accident while reducing the driver's own equipment burden. According to our simulations, adding the cover to the bicycle does not significantly increase air resistance.

Reference

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*** The data, journals, authors, dates and other details in the article are not real.**