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Effect of driving support system based on cycling characteristics at a nonsignalized intersection

Toshiya Hirose, Takumi Takada, Shoko Oikawa and Yasuhiro Matsui

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The number of traffic accident fatalities in Japan in 2019 was 3,215, which was 9% lower than that reported in 2018 (3,532). It has been reported that driving support systems, such as a collision avoidance system, are one of the factors that has influenced this decrease. However, fatal bicycle-related accidents account for 14% of all traffic accident fatalities, which has been the case for the past 11 years. Considering motor vehicle-bicycle accidents in Japan, the encounters at intersections account for approximately half of the total number of accidents between these two modes of transportation. In recent years, a new system has been developed that is able to detect the presence of a bicycle and apply emergency automatic braking when a collision is predicted, and this has been installed in some ordinary motor vehicles. However, new systems to detect bicycles are still being developed. To reduce bicycle accidents, it is desirable to develop a more advanced driving support system that considers the running characteristics of bicycles. Therefore, the purpose of this study is to clarify the running characteristics of a bicycle by analyzing their running conditions at a nonsignalized intersection where accidents frequently occur. We recorded a video at the nonsignalized intersection in Tokyo for three days. In the present study, we analyzed the behaviors of approximately 3,000 bicyclists that passed through this intersection over the course of three days. The crossroads of the target intersections are all relatively small with a road width of approximately 4 to 5 m, and no traffic lights were present at the intersection. The intersection is located about 600 m from a train station, and many bicycles pass through the intersection, especially during commuting hours. As a result of analyzing the bicycle speeds, the average speed when entering the intersection was determined to be 3.13 m/s (n=2997). Considering the directions, the bicycles were travelling from, the average speed of a bicycle entering the intersection from the north was 2.98 m/s (n=829) and the average speed of a bicycle entering the intersection from the south was 3.28 m/s (n=2168). By utilizing the results obtained in this study, a more effective driving support system for preventing bicycle-related accidents could be developed.