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Experimental validation of a computer-vision based method to assess the aerodynamic drag of cyclists

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Abstract: During the last three Science and Cycling conferences we presented a new system for measuring cyclist's drag. This system based on computer vision technologies provides dynamic 3D models (3D+t) of the cyclist in motion and a CFD solver processes these models in order to assess the aerodynamic resistive forces.

Last year, we compared the results obtained with our system and the drag forces processed from a dataset recorded on an indoor track. Unfortunately we were unable to definitively validate our technique due to the poor repeatability of the drag evaluation method on the track.

In order to obtain experimental data with much higher repeatability, we performed wind tunnel recordings. We recorded data for 3 different subjects, 3 positions (upright, brake-hoods, and dropped position), 3 wind speeds (30, 40, 50 km/h) and 4 crankset positions (0, 45 90, 135 degrees).

In order to make a comparison, each cyclist was recorded in our 3D + t system and CFD simulations were performed to obtain a set of data under the same experimental conditions. We present the results of the comparison between the drag obtained with our method and the drag measured in the wind tunnel.

Keywords: cycling, aerodynamic, 3D scanning, CFD