

Comparison of Number of Waves Surfed and Duration Using Global Positioning System and Inertial Sensors

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Abstract : Surf is an increasingly popular sport and its performance evaluation is often qualitative. This work aims at using a smartphone to collect and analyze the GPS and inertial sensors data in order to obtain quantitative metrics of the surfing performance. Two approaches are compared for detection of wave rides, computing the number of waves rode in a surfing session, the starting time of each wave and its duration. The first approach is based on computing the velocity from the Global Positioning System (GPS) signal and finding the velocity thresholds that allow identifying the start and end of each wave ride. The second approach adds information from the Inertial Measurement Unit (IMU) of the smartphone, to the velocity thresholds obtained from the GPS unit, to determine the start and end of each wave ride. The two methods were evaluated using GPS and IMU data from two surfing sessions and validated with similar metrics extracted from video data collected from the beach. The second method, combining GPS and IMU data, was found to be more accurate in determining the number of waves, start time and duration. This paper shows that it is feasible to use smartphones for quantification of performance metrics during surfing. In particular, detection of the waves rode and their duration can be accurately determined using the smartphone GPS and IMU.

Keywords : inertial measurement unit (IMU), global positioning system (GPS), smartphone, surfing performance

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