

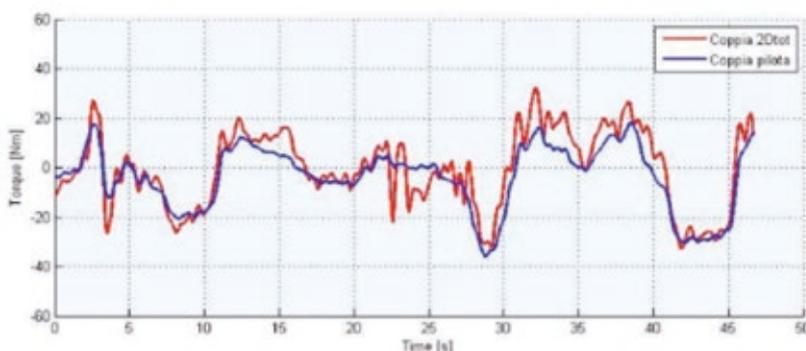
## Motorcycle's driver pose estimation using an action camera

The aim of this work is the development of a system to investigate how the driver interacts with the motorcycle. An apparatus and algorithm was developed to measure the pilot's position with respect to the vehicle, while driving normally on the street or on the track. A single camera records the movements of the pilot, then processing the recorded video it's possible to estimate the position (6 DOF) of the rider's body.

Since nowadays affordable technological instruments are available with great accuracy, the use of commercial apparel combined with the calculation power of a laptop pc can provide results that a decade ago would have required great efforts. The principle to use a single camera to measure pilot's behavior has been recently adopted as in [1] and [2] but it is still requiring a specif apparel and accurate mounting of the camera on the vehicle. In order to exclude errors due to inaccurate hardware setup, and allow fast mounting on every vehicle, an innovative procedure was developed in which is useless to know the position of the camera on the vehicle, and moreover accidental movements of the camera and low frequency vibrations becomes irrelevant for the measure.

As result in field tests is presented a comparison among the developed system and a traditional instrumented motorcycle. The motorcycle is equipped with sensors in order to measure the torque exerted by the pilot on the vehicle along the rolling direction. Sensors includes an instrumented handlebar, pedals and saddle, which are considered the contact points of the human body with the motorcycle.

The same torque was calculated using a simple human model as described above.



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Main research topics

- Dynamics of two-wheeled vehicles
- Dynamics and control of the vehicle
- Identification of the mechanical properties of vehicle components
- Development of driving simulators
- Modelling of active and passive behaviour of the pilot of two-wheeled vehicles