

A visual template-matching method for articulation angle measurement

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Abstract

Active control systems for heavy goods vehicles (HGVs) are becoming more sophisticated, necessitating more extensive and sophisticated instrumentation. For articulated HGVs, articulation angle sensing is crucial for most such systems and existing and proposed sensing methods are limited either in terms of commercial feasibility or measurement accuracy. This paper investigates a vision-based system consisting of a single tractor-mounted camera, a template-matching image processing algorithm and an Unscented Kalman Filter. The method is applicable to trailers with planar fronts and requires minimal geometric knowledge of the trailer. A series of tests was performed on a tractor semitrailer combination. The vision system was able to measure articulation angle with RMS errors of 0.64° – 0.79° and maximum errors of 1.91° – 2.76° .

Keywords—articulation angle; heavy goods vehicle; template-matching; computer vision; articulated vehicle