[ME03]
Development of driving assistant system for smart vehicle from series of image sequence

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Some of the elements that can cause danger like the distance between two cars, which are drove too close to each other, increase the risk of accident. Computer assisted system that detects and tracks a car at the in front enables this system monitors how a driver drives his car so that the safe distant can be maintained and reduce the risk of accident from happening. In this case, driving behavior is studied using visual information, which is collected from image sequences. This approach is chosen because driving responds happened due to driving information where 80% of them are through visual signal. A camera is mounted on the dashboard of the smart car and captures the front view images as if it acts as a driver's eye. In this study, several road conditions and situations are studied: road without obstacle, road with vehicle or obstacle and lane. Analysis that is based on simulation is done on the sequence of images. Every sequence of the images is transformed geometrically by inverse perspective mapping technique. This technique changes the viewing angle from a side view angle onto a top view angle, thus removing perspective distortion effect, foreshortening factor and vanishing point. A lane marker detection module for both the left and right is developed so that those two detected lane will act as boundaries for the lane. This module combines the Hough transform technique, which detects straight line with a new proposed algorithm, which forms a linkage of a group of shorter lines to form one long line. Inside the region that is bounded by the two lane markers, obstacle such as a car is spotted and its distance from the smart car will be determined. Additionally, lane-changing module is also developed. This module is based on advancement of the lane marker detection module. With the implementation of inverse perspective mapping technique, the measurement of the distance from the smart car and the trailing car can be performed within 0.5 to 20 meter with accuracy up to 3.23σ. Both modules for detecting lane marker and trailing car successfully detect their objectives. The tests are done during daytime where light intensity ranges from 215.2 to 1721.6 lux and including shadow effects and unwanted features painted on the surface of the road.