

## An Integrated Solution Based Irregular Driving Detection

This thesis introduces a new integrated algorithm for the detection of lane-level irregular driving. To date, there has been very little improvement in the ability to detect lane level irregular driving styles, mainly due to a lack of high performance positioning techniques and suitable driving pattern recognition algorithms. The algorithm combines data from the Global Positioning System (GPS), Inertial Measurement Unit (IMU) and lane information using advanced filtering methods. The vehicle state within a lane is estimated using a Particle Filter (PF) and an Extended Kalman Filter (EKF). The state information is then used within a novel Fuzzy Inference System (FIS) based algorithm to detect different types of irregular driving. Simulation and field trial results are used to demonstrate the accuracy and reliability of the proposed irregular driving detection method.

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