

Optical Flow Algorithm for Velocity Estimation of Ground Vehicles: A Feasibility Study

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Abstract- This paper presents a novel velocity estimation method for all terrain ground vehicles. The technique is based on a camera that scans the ground and estimates the velocity by using an optical flow algorithm. The method is tested and validated for different types of terrains such as fine sand, coarse sand, gravel as well as a mixture of coarse sand and gravel. Measured velocities from precise encoders are compared with the velocities predicted by the optical flow algorithm, showing promising potential for implementation of the suggested approach in ground vehicles. Investigations have been carried out to determine the optimal feature window size and the influence of camera height on optical flow velocity estimates. Detailed laboratory experiments were carried out to validate the velocity estimation technique and results indicate the usefulness of the proposed method for velocity estimation of ground vehicles.