Robot Vision For Driver Support Systems

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***Abstract*— In this paper, we give and overview of current research in vision systems for driver support on the ANU/NICTA Autonomous Vehicle. We particularly focus on automated sign recognition, presenting new results on detecting give way, stop and information signs, as well as back-projecting to find the world position of the sign. Our research focus within the project is on vision systems that run in real-time, and are integrated within the car itself to support the driver in making decisions. Our approach also monitors the driver state (such as gaze direction) and car state (e.g., velocity) to determine what additional support information should be presented to the driver. Although these systems may link directly into vehicle control systems, the actions of the car are always finally under the control of the driver.**

I. Introduction

Road scenes provide unique and interesting challenges for robotic vision. They are in outdoor environment with its associated extremes of illumination, but at the same time is a well structured built environment that is designed for easy perception. On the one hand the environment is highly dynamic, and at high speed will change faster than most robot vision environments requiring fast processing, on the other hand many features of interest are known in advanced, and their appearance is well-constrained. In this paper, we demonstrate that robot vision systems can be created that are effective in such a dynamic environment, producing robust identification of features that are relevant to the driver. This can be performed by taking advantage of the natural constraints of the interaction between the vehicle and its environment. In this paper we particularly demonstrate this through sign recognition. We present research for real-time sign recognition, and for identifying the location of the signs in the environment, and closing the loop by examining whether the driver has perceived the sign through monitoring the car and driver state.