# A Three-Step Vehicle Detection Framework for Range Estimation Using a Single Camera

Ritesh Kanjee
Optronic Sensor Systems
Defence, Peace, Safety and Security
Council for Sci. & Ind. Research
ritesh.kanjee@icloud.com

Asheer K. Bachoo
Research Associate Tsotsos Lab
Lassonde School of Engineering
York University
abachoo@gmail.co.za

Johnson Carroll
Engineering and the Built Environment
University of Johannesburg
jcarroll@uj.ac.za

## Abstract

This paper proposes and validates a real-time onroad vehicle detection system, which uses a single camera for the purpose of intelligent driver assistance. A three-step vehicle detection framework is presented to detect and track the target vehicle within an image. In the first step, probable vehicle locations are hypothesized using pattern recognition. The vehicle candidates are then verified in the hypothesis verification step. In this step, lane detection is used to filter vehicle candidates that are not within the lane region of interest. In the final step tracking and online learning are implemented to optimize the detection algorithm during misdetection and temporary occlusion. Good detection performance and accuracy was observed in highway driving environments with minimal shadows.