

# Eliminating the Blind Spot: Adapting 3D Object Detection and Monocular Depth Estimation to 360 Panoramic Imagery

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**Abstract.** Recent automotive vision work has focused almost exclusively on processing forward-facing cameras. However, future autonomous vehicles will not be viable without a more comprehensive surround sensing, akin to a human driver, as can be provided by 360 panoramic cameras. We present an approach to adapt contemporary deep network architectures developed on conventional rectilinear imagery to work on equirectangular 360 panoramic imagery. To address the lack of annotated panoramic automotive datasets availability, we adapt contemporary automotive dataset, via style and projection transformations, to facilitate the cross-domain retraining of contemporary algorithms for panoramic imagery. Following this approach we retrain and adapt existing architectures to recover scene depth and 3D pose of vehicles from monocular panoramic imagery without any panoramic training labels or calibration parameters. Our approach is evaluated qualitatively on crowd-sourced panoramic images and quantitatively using an automotive environment simulator to provide the first benchmark for such techniques within panoramic imagery.

**Keywords:** object detection, panoramic imagery, monocular 3D object detection, style transfer, monocular depth, panoramic depth, 360 depth

## 1 Introduction

Recent automotive computer vision work (object detection [51,50], segmentation [3], stereo vision [38,49], monocular depth estimation [41,26,1]) has focused almost exclusively on the processing of forward-facing rectified rectilinear vehicle mounted cameras. Indeed by sharp contrast to the abundance of common evaluation criteria and datasets for the forward-facing camera case [19,18,4,39,48,16,2], there are no annotated evaluation datasets or frameworks for any of these tasks using 360 view panoramic cameras.







































