U.S. Department of Transportation
Volpe Center

SANTOS FAMILY FOUNDATION

Vehicle Blind Spot Identification and Characterization

Volpe SCOPE team made a methodology to identify and characterize blind spots in large vehicles and used our analysis to inform the creation of a safety ranking system that will influence future truck design and fleet policies.

OUR **GOAL**

Protect vulnerable road users such as pedestrians bicyclists from potentially fatal collisions with vehicles in highly trafficked urban areas.

URBAN **SAFETY**

- Pedestrian / cyclist collisions increasing since 2009
- 5987 pedestrians & 840 cyclists fatalities in 2016, 18% of all traffic fatalities that year
- 11% of bicycle fatalities due to trucks
- Limited fields of view increases collision chance

DIRECT **VISION**

The visible area through a transparent plane disregarding mirrors, cameras, lenses, and other vision aids.
Direct vision reaction times are approximately 0.7 seconds faster than that of indirect vision.

PROBLEM **SPACE**

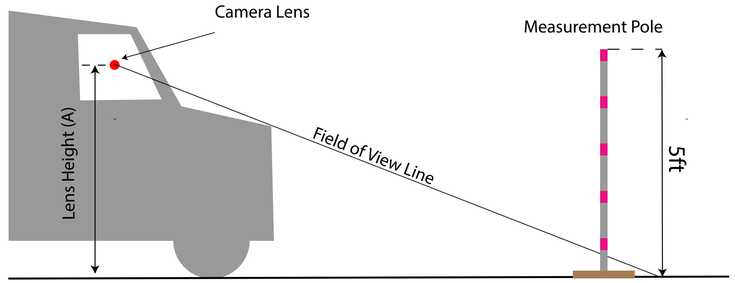
Currently there is not an independent, repeatable method for quantifying direct vision in vehicles in the US. Our goal is threefold, we hope to:

- Make visibility a safety metric used by fleet managers in purchasing decisions
- Create a method insurance companies could use to adjust rates based on vehicle safety
- Give vehicle manufactures a standard to measure their cab designs against to promote safer design

Through these means, we aim for our method to influence what vehicles are on the road in the US.

OUR **METHOD**

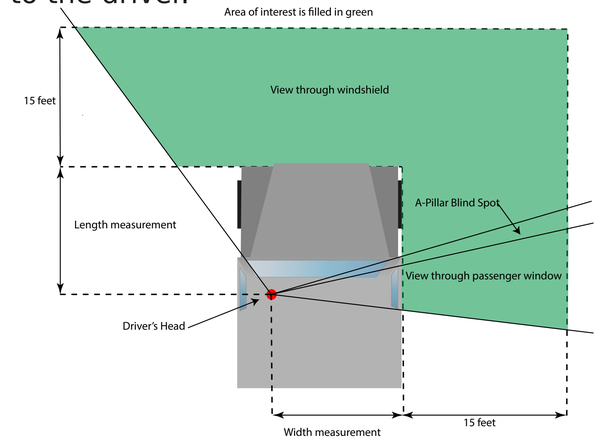
Our method uses a measurement pole, smartphone, and optional camera stand. Users take a panoramic photo from within the cab and take several measurements for calculations. Users upload the image and measurements to our website. Our program propagates lines across the image to determine the height of visibility at the radius of the measurement pole. From here the nearest visible point on the ground can be calculated.



RANKING **CALCULATIONS**

The nearest visible point is calculated for each given column of pixels in the panoramic image. The area under the line from this point to the drivers eye point is then calculated as the the blind area, this is integrated across our area of interest to generate the blind volume.

This volume of interest extends 15 feet beyond the front and passenger sides of the truck. We selected a 15 foot boundary based on where pedestrians are located before fatal crashes. This volume extends upwards 6’2” which is the 95th percentile male height in the US as seeing above this does not impact pedestrians. Trucks are then judged on what percentage of this volume is visible to the driver.



METHOD **RESULTS**

Cost: $45.82
Repeatability: 2.7% standard deviation between trials
Time: 10 minutes

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