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June 2, 2017



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Uber

## Uber is '5,000 times worse than Google's Waymo at self-driving cars'

Statistics show minicab firm is worst of six major self-driving car companies, with human intervention required at one-mile intervals during testing



This article is 1 month old

541

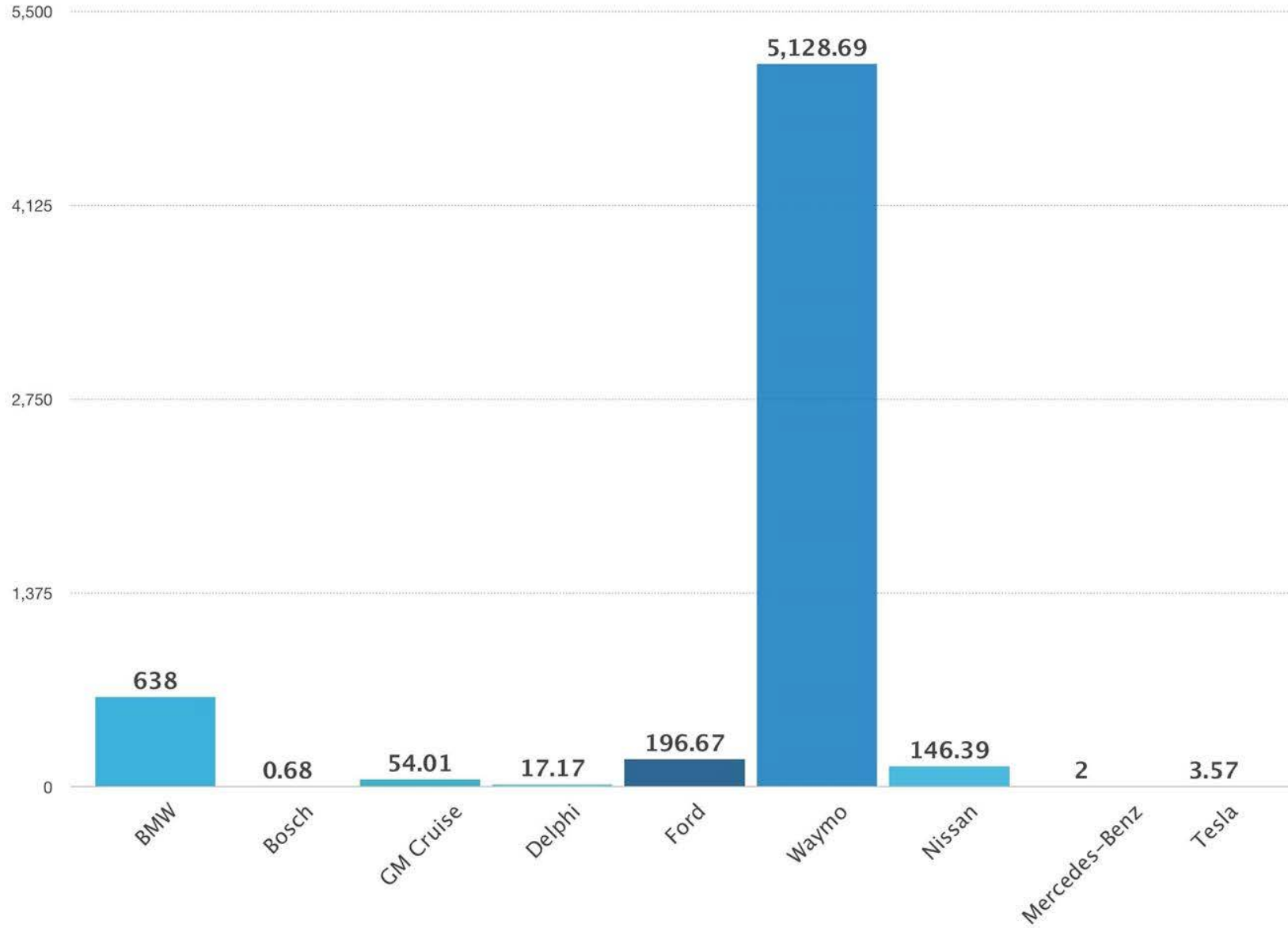
Alex Hern

@alexhern

Tuesday 4 April 2017 11.30 BST



# Miles Driven Per Disengagement 2016





State of California  
Department of Motor Vehicles

## Autonomous Vehicle Disengagement Reports 2016

Section 227.46 of Article 3.7 (Autonomous Vehicles) of Title 13 , Division 1,  
Chapter 1, California Code of Regulations



...**caveat** on the California DMV data

“they all submit it in different ways.

There are also **different types of disengagement** such as when the car is going to hit something (critical) or when the safety driver feels uncomfortable (ordinary).

Furthermore, companies **test their cars in different conditions** meaning that the data can really only be used as indication.

However, the contrasts are so stark that we think that meaningful conclusions can be drawn about how advanced the autonomous driving solutions from different players really are.”

In an emailed response provided...by Uber, the company emphasized that "each company measuring disengagements defines their interventions differently, so they **do not make for an accurate apples-to-apples comparison.**”

*EnterpriseTech.com March 30, 2017*



Table of Miles:

| Month        | Autonomous miles | Disengagements |
|--------------|------------------|----------------|
| Jul 2015     | 0                | 0              |
| Aug 2015     | 0                | 0              |
| Sep 2015     | 0                | 0              |
| Nov 2015     | 0                | 0              |
| Dec 2015     | 0                | 0              |
| Jan 2016     | 0                | 0              |
| Feb 2016     | 0                | 0              |
| Mar 2016     | 62               | 0              |
| Apr 2016     | 576              | 1              |
| May 2016     | 0                | 0              |
| Jun 2016     | 0                | 0              |
| Jul 2016     | 0                | 0              |
| Aug 2016     | 0                | 0              |
| Sep 2016     | 0                | 0              |
| Oct 2016     | 0                | 0              |
| Nov 2016     | 0                | 0              |
| <b>Total</b> | <b>638</b>       | <b>1</b>       |

**Company**  
BMW of North America, LLC

BMW Group Company

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**Appendix A**  
**Summary of Each Reportable Disengagement**

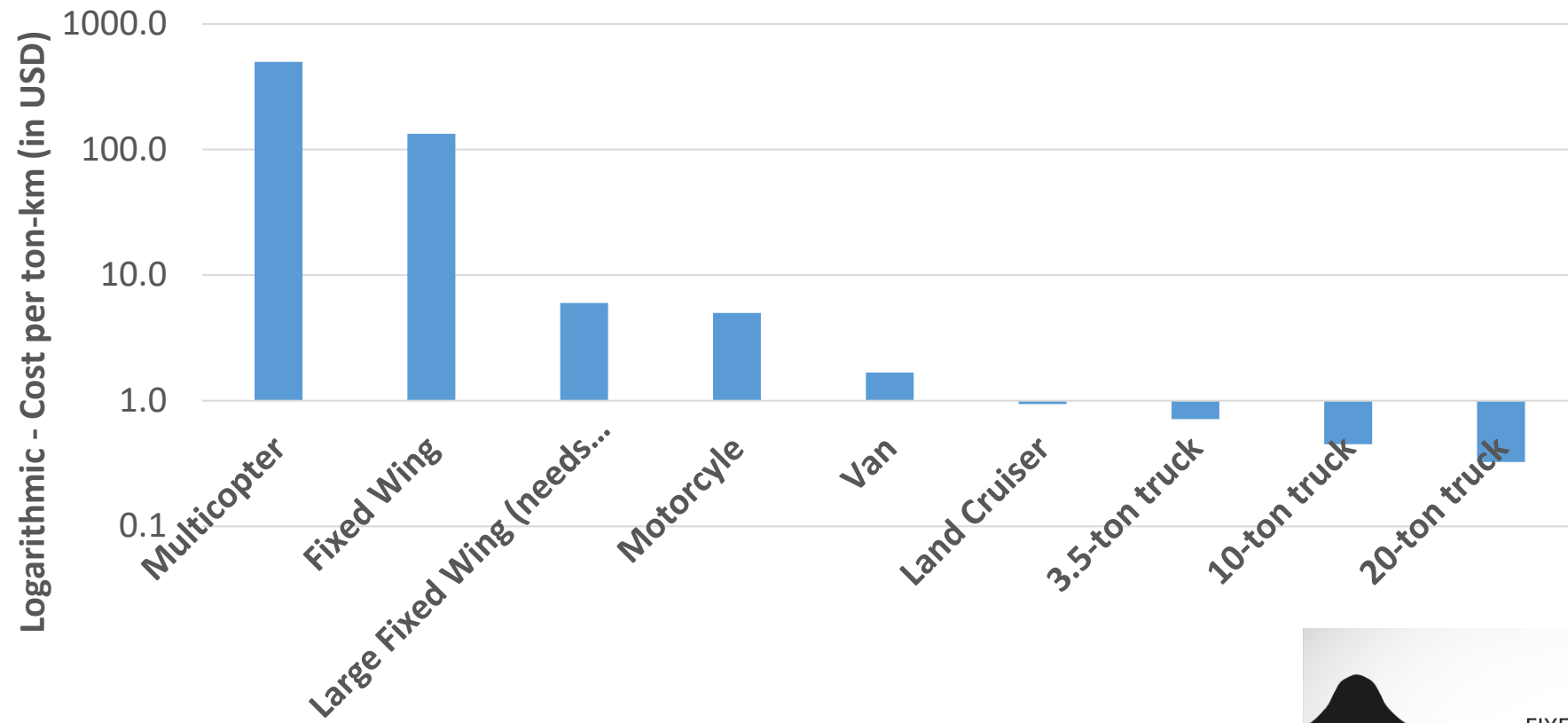
| Date     | Location | Type              | Time to manual | Cause   |
|----------|----------|-------------------|----------------|---|
| Dec 2015 | Street   | Failure Detection | 0.1s           | Disengage for a software discrepancy                                      |
| Dec 2015 | Street   | Safe Operation    | -              | Disengage for weather conditions during testing                           |
| Jan 2016 | Street   | Safe Operation    | -              | Disengage for incorrect behavior prediction of other traffic participants |
| Jan 2016 | Street   | Safe Operation    | -              | Disengage for unwanted maneuver of the vehicle                            |
| Jan 2016 | Street   | Safe Operation    | -              | Disengage for unwanted maneuver of the vehicle                            |
| Jan 2016 | Street   | Safe Operation    | -              | Disengage for a perception discrepancy                                    |
| Jan 2016 | Street   | Safe Operation    | -              | Disengage for a perception discrepancy                                    |
| Jan 2016 | Street   | Safe Operation    | -              | Disengage for a perception discrepancy                                    |
| Feb 2016 | Street   | Safe Operation    | -              | Disengage for unwanted maneuver of the vehicle                            |
| Feb 2016 | Street   | Safe Operation    | -              | Disengage for a recklessly behaving road user                             |
| Feb 2016 | Street   | Safe Operation    | -              | Disengage for unwanted maneuver of the vehicle                            |
| Feb 2016 | Street   | Safe Operation    | -              | Disengage for a perception discrepancy                                    |
| Feb 2016 | Street   | Safe Operation    | -              | Disengage for unwanted maneuver of the vehicle                            |
| Feb 2016 | Highway  | Safe Operation    | -              | Disengage for unwanted maneuver of the vehicle                            |
| Feb 2016 | Street   | Safe Operation    | -              | Disengage for a software discrepancy                                      |
| Mar 2016 | Street   | Safe Operation    | -              | Disengage for a perception discrepancy                                    |
| Mar 2016 | Street   | Safe Operation    | -              | Disengage for emergency vehicle during testing                            |
| Mar 2016 | Street   | Safe Operation    | -              | Disengage for emergency vehicle during testing                            |
| Mar 2016 | Street   | Failure Detection | 1.7s           | Disengage for a software discrepancy                                      |
| Mar 2016 | Street   | Failure Detection | 1.3s           | Disengage for a software discrepancy                                      |
| Mar 2016 | Street   | Failure Detection | 1.0s           | Disengage for a software discrepancy                                      |



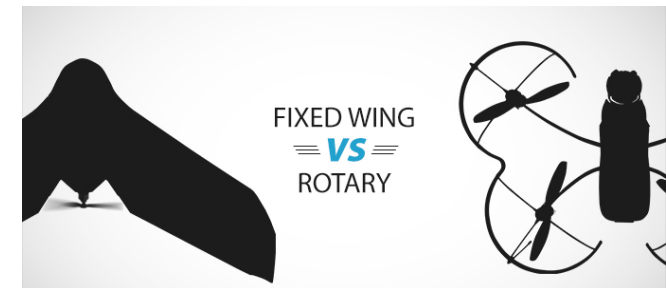


# Using average figures – Comparing land transport options with UAVs on a Cost per ton-km basis

Logarithmic - Cost per ton-km by Mode (Air and Land in Public Health)



Source: Public data estimates and LLamasoft projects across Africa





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