



Drive.ai, Inc.  
365 Ravendale Dr.  
Mountain View, CA 94043

28 December 2017

DMV – Occupational Licensing  
8243 Demetre Ave., MS L224  
Sacramento, CA 95828

Dear Sir or Madam,

Pursuant to California Code of Regulations Title 13, Article 3.7, Section 227.46, we hereby submit our Summary Report of Disengagements of Autonomous Mode. This report covers all autonomous operation from our date of licensure, 19 April 2016, until the closing date of the first reporting period, 30 November 2017.

Specifically, this report covers 1) the total number of miles each autonomous vehicle tested in autonomous mode on public roads each month and 2) all disengagements that occurred when a failure of the autonomous technology was detected or when the safe operation of the vehicle required that the autonomous vehicle test driver disengage the autonomous mode and take immediate manual control of the vehicle.

As of 30 November 2017, we have seven vehicles licensed for autonomous operation in California. A few points of summary:

- a. Total autonomous miles: 6,572. We drove 557 autonomous miles in 2016 and 6,015 autonomous miles in 2017.
- b. Total disengagements: We had a total of 151 disengagements where either a failure of the autonomous technology was detected or safe operation of the vehicle required that the test driver take manual control.
- c. Miles driven per disengagement (MPD): We have improved from 3 MPD in August 2016 to 110 MPD in November 2017.
- d. Most importantly, we are pleased to report that we completed our first reporting period without any collisions or safety incidents of any kind.

Full details of our autonomous vehicle operation follow in the enclosed report. Please feel free to contact me with any questions.

Sincerely,

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Carol Reiley  
President

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Tory Smith  
Technical Program Manager

# Summary Report of Disengagements of Autonomous Mode

## Introduction

This report contains a summary of autonomous vehicle operations conducted by Drive.ai, Inc. on public roads in the State of California for the period beginning 19 April 2016 and ending 30 November 2017.

The total number of miles that each autonomous vehicle was tested on public roads, as well as the locations of this testing, are provided.

All disengagements that occurred when a failure of the autonomous technology was detected or when the safe operation of the vehicle required that the autonomous vehicle test driver disengage the autonomous mode and take immediate manual control of the vehicle are summarized herein.

## Vehicles

As of 30 November 2017, Drive.ai had a fleet of seven vehicles licensed for autonomous operation in the State of California. Details for these vehicles are shown in Table 1.

**Table 1.** Tabulated details of Drive.ai autonomous vehicles as of 30 November 2017.

Vehicle Nickname	Make	Model	Year	License
COCO1	Lincoln	MKZ	2016	7RLP330
COCO2	Lincoln	MKZ	2016	7SYS687
COCO3	Lincoln	MKZ	2016	7SQX189
COCO4	Audi	A4	2017	7UGR620
COCO5	Nissan	NV200	2015	99400E2
COCO6	Nissan	NV200	2016	7ZIT090
COCO7	Nissan	NV200	2016	7ZIT074

## Autonomous Miles Driven

For the period covered in this report, Drive.ai drove a total of 6572.4 autonomous miles on public roads in California and was involved in zero collisions or safety incidents of any kind. All autonomous miles driven in the period covering 19 April 2016 through 30 November 2017 were driven in Santa Clara County, CA. Details of these miles per month and per vehicle are provided in Table 2.

**Table 2.** Total miles driven by month and vehicle.

<b>Year/ Month</b>	<b>COCO1</b>	<b>COCO2</b>	<b>COCO3</b>	<b>COCO4</b>	<b>COCO5</b>	<b>COCO6</b>	<b>COCO7</b>	<b>Total</b>
2016 Apr	0	0	0	0	0	0	0	0
2016 May	0	0	0	0	0	0	0	0
2016 Jun	0	0	0	0	0	0	0	0
2016 Jul	0	0	0	0	0	0	0	0
2016 Aug	101.0	1.4	0	0	0	0	0	102.4
2016 Sept	0	6.1	0	0	0	0	0	6.1
2016 Oct	0	259.1	0	0	0	0	0	259.1
2016 Nov	0	77.2	0	0	0	0	0	77.2
2016 Dec	0	0	100.6	11.6	0	0	0	112.2
2017 Jan	2.1	0	436.1	44.8	0	0	0	483.0
2017 Feb	39.8	0	254.5	0	0	0	0	294.3
2017 Mar	0	0	277.3	0	0	0	0	277.3
2017 Apr	0	0	126.8	0	0	0	0	126.8
2017 May	0	0	54.3	0	0	0	0	54.3
2017 Jun	0	0	20.6	0	0	0	0	20.6
2017 Jul	0	0	54.1	0	0	0	0	54.1

2017 Aug	118.8	0	26.6	0	0	0	0	145.4
2017 Sept	184.1	0	10.3	0	0	0	0	194.4
2017 Oct	1697.2	0	25.5	0	0	0	0	1722.7
2017 Nov	2206.6	27.2	408.7	0	0	0	0	2642.5
TOTAL	4349.6	371.0	1795.4	56.4	0	0	0	<b>6572.4</b>

### Disengagements of Autonomous Mode

This section contains information regarding all disengagements that occurred when a failure of the autonomous technology was detected or when the safe operation of the vehicle required that the autonomous vehicle test driver disengage the autonomous mode and take immediate manual control of the vehicle.

All disengagements occurred on public urban and suburban roads in Santa Clara County, CA. In cases where safe operation of the vehicle required that the driver disengage the autonomous mode, the disengagements were instantaneous. In cases where a failure of the autonomous technology was detected, the driver was notified of this failure via a system alert and took over in less than one second.

Table 3 details the number of miles driven and the number of disengagements for each month covered by this report. Table 4 contains summary statistics for autonomous miles driven and disengagements of autonomous mode for 2016 and 2017 operation. Finally, Table 5 contains details for each disengagement, including the root cause, the weather conditions, and the time of day.

**Table 3.** Summary of disengagements by month.

Year/Month	Autonomous Miles Driven	Disengagements
2016 April	0.0	0
2016 May	0.0	0
2016 June	0.0	0
2016 July	0.0	0
2016 August	102.4	33
2016 September	6.1	1
2016 October	259.1	16

2016 November	77.2	8
2016 December	112.2	1
2017 January	483.0	16
2017 February	294.3	6
2017 March	277.3	9
2017 April	126.8	3
2017 May	54.3	1
2017 June	20.6	0
2017 July	54.1	0
2017 August	145.4	5
2017 September	194.4	5
2017 October	1722.7	23
2017 November	2642.5	24

**Table 4.** Average miles driven per disengagement, 2016 versus 2017

Year	Autonomous Miles Driven	Disengagements	Autonomous Miles per Disengagement (Average for Calendar Year)
2016	557.0	59	9.44
2017	6015.4	92	65.38

**Table 5.** Details of Disengagements of Autonomous Mode

<b>Date</b>	<b>Root cause of Disengagement</b>	<b>Weather</b>	<b>Day / Night</b>
8/1/2016	Undesired motion planning behavior	Fair	Day
8/1/2016	Precautionary for nearby cyclist	Fair	Day
8/1/2016	Undesired motion planning behavior	Fair	Day
8/1/2016	Undesired motion planning behavior	Fair	Day
8/1/2016	Undesired motion planning behavior	Fair	Day
8/2/2016	Undesired motion planning behavior	Fair	Day
8/2/2016	Error in perception system detection	Fair	Day
8/2/2016	Undesired motion planning behavior	Fair	Day
8/12/2016	Undesired motion planning behavior	Fair	Day
8/12/2016	Undesired motion planning behavior	Fair	Day
8/15/2016	Error in perception system detection	Fair	Day
8/15/2016	Cyclist riding from sidewalk into crosswalk	Fair	Day
8/15/2016	Undesired motion planning behavior	Fair	Day
8/16/2016	Undesired motion planning behavior	Fair	Day
8/16/2016	Undesired motion planning behavior	Fair	Day
8/19/2016	Error in perception system detection	Fair	Day
8/19/2016	Precautionary disengagement for long yellow light	Fair	Day
8/20/2016	Undesired motion planning behavior	Fair	Day
8/20/2016	Precautionary disengagement for long yellow light	Fair	Day
8/20/2016	Precautionary disengagement for jaywalker	Fair	Day
8/20/2016	Precautionary for nearby cyclist	Fair	Day
8/20/2016	Undesired motion planning behavior	Fair	Day
8/20/2016	Undesired motion planning behavior	Fair	Day
8/21/2016	Undesired motion planning behavior	Fair	Day
8/21/2016	Precautionary disengagement for pedestrian near curb	Fair	Day
8/21/2016	Precautionary for late cut-in from other vehicle	Fair	Day
8/22/2016	Undesired motion planning behavior	Fair	Day
8/24/2016	Precautionary for nearby cyclist	Fair	Day
8/25/2016	Undesired motion planning behavior	Fair	Day
8/26/2016	Undesired motion planning behavior	Fair	Day

8/26/2016	Undesired motion planning behavior	Fair	Day
8/29/2016	Undesired motion planning behavior	Fair	Day
8/29/2016	Undesired motion planning behavior	Fair	Day
9/13/2016	Cyclist riding from sidewalk into crosswalk	Fair	Day
10/20/2016	Undesired motion planning behavior	Fair	Day
10/20/2016	Undesired motion planning behavior	Fair	Day
10/20/2016	Cyclist riding from sidewalk into crosswalk	Fair	Day
10/20/2016	Precautionary for late cut-in from other vehicle	Fair	Day
10/21/2016	Undesired motion planning behavior	Fair	Day
10/24/2016	Undesired motion planning behavior	Fair	Day
10/24/2016	Undesired motion planning behavior	Fair	Day
10/26/2016	Undesired motion planning behavior	Fair	Day
10/27/2016	Undesired motion planning behavior	Fair	Day
10/28/2016	Precautionary for late cut-in from other vehicle	Fair	Day
10/28/2016	Undesired motion planning behavior	Fair	Day
10/28/2016	Error in perception system detection	Fair	Day
10/28/2016	Undesired motion planning behavior	Fair	Day
10/28/2016	Precautionary for nearby cyclist	Fair	Day
10/31/2016	Undesired motion planning behavior	Fair	Day
10/31/2016	Undesired motion planning behavior	Fair	Day
11/1/2016	Undesired motion planning behavior	Fair	Day
11/1/2016	Undesired motion planning behavior	Fair	Day
11/1/2016	Precautionary for late cut-in from other vehicle	Fair	Day
11/1/2016	Undesired motion planning behavior	Fair	Day
11/21/2016	Undesired motion planning behavior	Fair	Day
11/21/2016	Error in perception system detection	Fair	Day
11/21/2016	Undesired motion planning behavior	Fair	Day
11/24/2016	Undesired motion planning behavior	Fair	Day
12/13/2016	Precautionary disengagement for pedestrian near curb	Fair	Night
1/3/2017	Precautionary for vehicle exiting parking lot	Fair	Day
1/4/2017	Error in perception system detection	Fair	Day
1/7/2017	Undesired motion planning behavior	Fair	Day
1/8/2017	Error in perception system detection	Fair	Day

1/9/2017	Precautionary disengagement for long yellow light	Rain	Day
1/9/2017	Undesired motion planning behavior	Fair	Day
1/10/2017	Error in perception system detection	Rain	Day
1/10/2017	Precautionary disengagement for pedestrian near curb	Rain	Day
1/12/2017	Precautionary for late cut-in from other vehicle	Fair	Day
1/12/2017	Precautionary disengagement for long yellow light	Rain	Day
1/17/2017	Undesired motion planning behavior	Fair	Day
1/18/2017	Undesired motion planning behavior	Rain	Day
1/20/2017	Vehicle in cross-traffic ran red light	Rain	Day
1/23/2017	Undesired motion planning behavior	Rain	Day
1/24/2017	Localization error	Fair	Day
1/26/2017	Error in perception system detection	Fair	Day
2/3/2017	Undesired motion planning behavior	Rain	Day
2/15/2017	Undesired motion planning behavior	Fair	Day
2/16/2017	Precautionary disengagement for pedestrian near curb	Fair	Day
2/17/2017	Undesired motion planning behavior	Rain	Day
2/23/2017	Precautionary disengagement for pedestrian near curb	Fair	Day
2/24/2017	Undesired motion planning behavior	Fair	Day
3/8/2017	Undesired motion planning behavior	Fair	Day
3/8/2017	Cyclist riding from sidewalk into crosswalk	Fair	Day
3/10/2017	Undesired motion planning behavior	Fair	Day
3/12/2017	Undesired motion planning behavior	Fair	Day
3/14/2017	Vehicle in cross-traffic ran red light	Fair	Day
3/16/2017	Undesired motion planning behavior	Fair	Day
3/22/2017	Undesired motion planning behavior	Fair	Day
3/24/2017	Precautionary disengagement for pedestrian near curb	Rain	Day
3/31/2017	Undesired motion planning behavior	Fair	Day
4/6/2017	Undesired motion planning behavior	Rain	Day
4/25/2017	Undesired motion planning behavior	Fair	Day
4/25/2017	Undesired motion planning behavior	Fair	Day
5/25/2017	Cyclist riding from sidewalk into crosswalk	Fair	Day
8/9/2017	Undesired motion planning behavior	Fair	Day
8/16/2017	Undesired motion planning behavior	Fair	Day



8/16/2017	Undesired motion planning behavior	Fair	Day
8/24/2017	Undesired motion planning behavior	Fair	Day
8/24/2017	Undesired motion planning behavior	Fair	Day
9/2/2017	Precautionary disengagement for long yellow light	Fair	Day
9/2/2017	Error in perception system detection	Fair	Day
9/6/2017	Undesired motion planning behavior	Fair	Day
9/19/2017	Error in perception system detection	Fair	Day
9/19/2017	Precautionary disengagement for long yellow light	Fair	Day
10/5/2017	Precautionary disengagement for pedestrian near curb	Fair	Day
10/6/2017	Precautionary for late cut-in from other vehicle	Fair	Day
10/6/2017	Error in perception system detection	Fair	Day
10/6/2017	Undesired motion planning behavior	Fair	Day
10/6/2017	Undesired motion planning behavior	Fair	Day
10/9/2017	Error in perception system detection	Fair	Night
10/11/2017	Precautionary disengagement for long yellow light	Fair	Day
10/19/2017	Undesired motion planning behavior	Fair	Day
10/23/2017	Error in perception system detection	Fair	Day
10/23/2017	Undesired motion planning behavior	Fair	Night
10/23/2017	Localization error	Fair	Day
10/24/2017	Vehicle in cross-traffic ran red light	Fair	Day
10/24/2017	Precautionary disengagement for pedestrian near curb	Fair	Night
10/24/2017	Undesired motion planning behavior	Fair	Day
10/25/2017	Undesired motion planning behavior	Fair	Day
10/25/2017	Precautionary for late cut-in from other vehicle	Fair	Day
10/26/2017	Undesired motion planning behavior	Fair	Day
10/26/2017	Cyclist riding from sidewalk into crosswalk	Fair	Day
10/27/2017	Undesired motion planning behavior	Fair	Day
10/27/2017	Undesired motion planning behavior	Fair	Day
10/30/2017	Precautionary for vehicle exiting parking lot	Fair	Day
10/30/2017	Precautionary disengagement for pedestrian near curb	Fair	Day
10/31/2017	Error in perception system detection	Fair	Day
11/2/2017	Undesired motion planning behavior	Fair	Day
11/2/2017	Error in perception system detection	Fair	Night

11/3/2017	Precautionary for late cut-in from other vehicle	Fair	Day
11/3/2017	Precautionary disengagement for pedestrian near curb	Fair	Day
11/3/2017	Precautionary disengagement for long yellow light	Fair	Day
11/6/2017	Cyclist riding from sidewalk into crosswalk	Fair	Night
11/6/2017	Undesired motion planning behavior	Fair	Night
11/9/2017	Precautionary disengagement for long yellow light	Fair	Day
11/9/2017	Undesired motion planning behavior	Rain	Day
11/9/2017	Precautionary disengagement for pedestrian near curb	Fair	Day
11/13/2017	Undesired motion planning behavior	Fair	Day
11/13/2017	Error in perception system detection	Fair	Day
11/13/2017	Error in perception system detection	Fair	Night
11/14/2017	Undesired motion planning behavior	Fair	Day
11/14/2017	Precautionary disengagement for pedestrian near curb	Fair	Day
11/15/2017	Undesired motion planning behavior	Rain	Day
11/17/2017	Precautionary disengagement for long yellow light	Fair	Day
11/22/2017	Precautionary disengagement for pedestrian near curb	Fair	Day
11/22/2017	Precautionary for late cut-in from other vehicle	Fair	Day
11/27/2017	Undesired motion planning behavior	Fair	Day
11/27/2017	Sensor fusion error	Fair	Day
11/28/2017	Undesired motion planning behavior	Fair	Day
11/29/2017	Cyclist riding from sidewalk into crosswalk	Fair	Day
11/30/2017	Error in perception system detection	Fair	Day