

SMART DRIVING CARS

<http://smartdrivingcar.com/TeslaUpdate-0705416>

Tuesday, July 5, 2016

Hmmm...What we know now (and don't know):

1. On May 7, 2016 at about 4:40pm EDT, there was a crash between a Tesla and a Class 8 Tractor-Trailer. The accident is depicted in the [Diagram from the Police Report](#): HSMV Crash Report # 85234095. (1) [Google Earth images from the site](#).

2. The driver of the Tesla was [Joshua Brown](#). "No citations have been issued, but the initial accident report from the FHP indicates the truck driver "failed to yield right-of-way."" (2) . Hmmm....No Citations??? Did the truck have a data recorder? Was the truck impounded, if so, how is the truck driver making a living since the crash? Why was his truck not equipped with sensors that can warn him of collision risks at intersections? As I've written, driving is one of the most dangerous occupations. Why isn't OSHA concerned about improving the environment of these workers? Why doesn't ATRI (the American Trucking Association's research arm recognize the lack availability/adoption of "SmartDrivingTruck technology" as one of its [Critical Issues](#)? Why didn't his insurance agent encourage/convince him to equip his truck with collision risk sensors. If they aren't commercially available, why hasn't his insurance company invested/promoted/lobbied for their development? These low-volume rural highway intersections are very dangerous. Technology could help.

"...(the truck driver)...said he saw the Tesla approaching in the left, eastbound lane. Then it crossed to the right lane and struck his trailer. "I don't know why he went over to the slow lane when he had to have seen me," he said...." (2) . Hmmm....If the driver saw the Tesla change lanes, why did he "failed to yield right-of-way"???

"...Meanwhile, the accident is stoking the debate on whether drivers are being lulled into a false sense of security by such technology. A man who lives on the property where Brown's car came to rest some 900 feet from the intersection where the crash occurred said when he approached the wreckage 15 minutes after the crash, he could hear the DVD player. An FHP trooper on the scene told the property owner, Robert VanKavelaar, that a "Harry Potter" movie was showing on the DVD player, VanKavelaar told Reuters on Friday.

Another witness, Terence Mulligan, said he arrived at the scene before the first Florida state trooper and found "there was no movie playing." "There was no music. I was at the car. Right at the car," Mulligan told Reuters on Friday.

Sergeant Kim Montes of the Florida Highway Patrol said on Friday that "there was a portable DVD player in the vehicle," but wouldn't elaborate further on it. She also said there was no camera found, mounted on the dash or of any kind, in the wreckage....

...Mulligan said he was driving in the same westbound direction as the truck before it attempted to make a left turn across the eastbound lanes of U.S. Highway 27 Alternate when he spotted the Tesla traveling east. Mulligan said the Tesla did not appear to be speeding on the road, which has a speed limit of 65 miles per hour, according to the FHP..." (2).

3. "...the vehicle was on a divided highway with Autopilot engaged when a tractor trailer drove across the highway perpendicular to the Model S. Neither Autopilot nor the driver noticed the white side of the tractor trailer against a brightly lit sky, so the brake was not applied. The high ride height of the trailer combined with its positioning across the road and the extremely rare circumstances of the impact caused the Model S to pass under the trailer, with the bottom of the trailer impacting the windshield of the Model S. Had the Model S impacted the front or rear of the trailer, even at high speed, its advanced crash safety system would likely have prevented serious injury as it has in numerous other similar incidents..." (3). *Not sure how Tesla knows what Joshua Brown saw or did not see. Events prior to the crash unfolded over many seconds. Tesla must have precise data on the car's speed and steering angle, video for those many seconds prior to the crash, as well as, what it was "seeing" from MobilEye's cameras and radar data. At no time prior to the crash did it see anything crossing its intended travel lane? More important, why didn't the truck driver see the Tesla? WHAT WAS HE DOING? What was the truck doing. How slow was it going? Hopefully there was a data speed recorder on the truck. Was the truck impounded, if so, how is the truck driver making a living since the crash? One can also ask: Why was the truck not equipped with sensors that can warn the driver of collision risks at intersections? As I've written, driving is one of the most dangerous occupations. Why isn't OSHA concerned about improving this workplace environment? Why doesn't ATRI (the American Trucking Association's research arm) recognize the lack availability/ adoption of "SmartDrivingTruck technology" as one of its Critical Issues? Why didn't the driver's insurance agent encourage/convince him to equip his truck with collision risk sensors. If they aren't commercially available, why hasn't his insurance company invested/promoted/lobbied for their development? These low-volume rural highway intersections are very dangerous. Technology could help.*

While the discussion is about AutoPilot, the Tesla also has Automated Emergency Braking (AEB) which is supposed to always be on. This seems more like an AEB failure rather than an AutoPilot failure. The Tesla didn't just drive off the road, The discussion about "hands-on-wheels" is irrelevant. What was missing was "foot-on-brake" by the Tesla driver and "eyes-on-road" by, most importantly, the truck driver, since he initiated an action in violation to "rules of the road" that may have made a crash unavoidable.

3. **"Problem Description:** A fatal highway crash involving a 2015 Tesla Model S which, according to Tesla, was operating with automated driving systems ("Autopilot") engaged, calls for an examination of the design and performance of any driving aids in use at the time of the crash." (4). *Not to be picky, but the initiator of the crash was the failure to yield by the truck driver. Why isn't this human failure the most fundamental "Problem Description"? If "driving aids" were supposed to "bail out" the truck driver's failure to yield, why isn't the AEB system's "design and performance" being examined. AutoPilot's responsibility is to keep the Tesla from steering off the road (and, as a last resort, yield to the AEB). The focus should be on AEBs. How many other Tesla drivers*

*have perished that didn't have AutoPilot on, but had AEB? How many drivers have perished of other cars that have AEB? Seems as if this crash was more about an emergency automated systems failing to apply the brakes, rather than a driver not having his hands-on-wheel. Unfortunately, it is likely that we will eventually have a fatality in which an "AutoPilot" will fail to keep a "Tesla" on the road (or in a "correct" lane), but from what is known so far, this does not seem to be **the** crash.*

4. "What we learn here is that Mobileye's system in Tesla's Autopilot does gather the information from the vehicle's sensors, primarily the front facing camera and radar, but while it gathers the data, Mobileye's tech can't (or not well enough until 2018) recognize the side of vehicles and therefore, it can't work in a situation where braking is required to stop a Tesla from hitting the side of another vehicle.

Since Tesla pushed its 7.1 update earlier this year, the automaker's own system used the same data to recognize anything, under adequate conditions, that could obstruct the path of the Tesla and if the radar's reading is consistent with the data from the camera, it will apply the brakes.

Now that's something that was put to the test by Model S owners earlier in the week:" (4). See *video*, "In the last two tests, the Autopilot appears to detect an obstacle as evidenced by the forward collision warning alerts, but the automatic emergency braking didn't activate, which raised questions – not unlike in the fatal crash.

Though as Tesla explained, the trailer was not detected in the fatal crash, the radar confused it for an overhead sign, but in the tests above, the forward collision warning system sent out an alert – though as evidenced by the fact that the test subject wasn't hit, the AEB didn't need to activate and therefore it didn't. Tesla explains:

"AEB does not engage when an alternative collision avoidance strategy (e.g., driver steering) remains viable. Instead, when a collision threat is detected, forward collision warning alerts the driver to encourage them to take appropriate evasive action. AEB is a fallback safety feature that operates by design only at high levels of severity and should not be tested with live subjects."..." [Read more](#) (5) *With all of the expertise that MobilEye has in image processing, it is surprising that it can't recognize the side of a tractor trailer or gets confused with overhead signs and tunnel openings. If overhead signs (and overpasses and tree canopies) are really the issue, then these can be readily geocoded and included in the digital map database.)*

5. *It seems that all of the other stuff about DVD player, watching movies, previous postings on YouTube is noise. Automated Collision Avoidance Systems and their Automated Emergency Braking sub-system MUST be more robust a mitigating "failed to yield right-of-way" situations irrespective of the "failure to yield" derived from a human action (as seems to have occurred in this crash) or an "autoPilot" (which doesn't seem to be the case in this crash). Alain*

(1) [Self-Driving Tesla Was Involved in Fatal Crash, U.S. Says](#), June 30 NYT,

(2) [DVD player found in Tesla car in fatal May crash](#), July 1, Reuters

(3) [A Tragic Loss](#), June 30, Tesla Blog

(4) [NHTSA ODI Resume PE 16-007 Automatic vehicle control system, June 28, 2016](#)

(5) [Tesla elaborates on Autopilot's automatic emergency braking capacity over Mobileye's system](#) Electrek, July 2, 2016 See also: [Understanding the fatal Tesla accident on Autopilot and](#)

[the NHTSA probe July 2, 2016, Tesla Autopilot partner Mobileye comments on fatal crash, says tech isn't meant to avoid this type of accident \[Updated\], July 1,](#)

Some other thoughts that deserve your attention

The
New York
Times

[Now Orbiting Jupiter, NASA's Juno Spacecraft Is Poised for 'Tantalizing' Data](#)

The
New York
Times

[Our Vast Solar System and Its Many Explorers](#)

On the More Technical Side

<http://orfe.princeton.edu/~alaink/SmartDrivingCars/Papers/>

Calendar of Upcoming Events:



[ITE + ARRB Present Driverless Vehicles: Progress in the U.S. and Australia Webinar](#)

[My Slides](#)

Thursday, June 30, 2016,
6:00 PM - 7:30 PM (UTC-5:00) Eastern Time (US & Canada)