Robert Ruginis
[redacted]

September 11, 2014

The Honorable David Friedman
Acting Administrator
National Highway Traffic Safety Administration
1200 New Jersey Avenue, SE
West Building
Washington, DC 20590

Dear Acting Administrator Friedman:

RE: **Petition for a Defect Investigation under 49 U.S.C. § 30162 Petitions by interested persons for standards and enforcement**

This is a petition for an investigation into low-speed surging in the 2006-2010 Toyota Corolla with ETCS-i, in which the brakes fail to stop the vehicle in time to prevent a crash.

This request is based on first-hand experience in which multiple low-speed surge events that occurred while driving our 2010 Corolla. The latest incident resulted in a crash on June 8, 2014. In addition to the evidence from our crash incident, we are providing evidence that many other Corolla owners are experiencing similarly unsafe scenarios that are leading to crashes.

We purchased the vehicle new in May 2010. The MY2010 Corolla was subject to the floor mat entrapment and sticky accelerator recalls. The dealership applied the "sticky pedal" remedy in February, before we purchased the vehicle. The floor mat remedy was applied in November 2010.[1] Our Corolla did not have Toyota's Smart Stop technology installed. It would not have made a difference in this crash based on its operating characteristics. Offered as a customer satisfaction campaign and not a recall, Toyota's brake override, called Smart Stop Technology, "automatically reduces engine power when both pedals are pressed at the same time under certain conditions."[2] The override only engages when "the accelerator is depressed first, and the brakes are applied firmly for longer than one-half second at speeds greater than five miles per hour." "The feature doesn't engage if the brake pedal is depressed before the accelerator pedal."

At the time of the crash, a sunny, temperate afternoon, my wife, [redacted] was making a slow, right hand turn to ease into a parking space on High Street in Bristol, Rhode Island. Her

[1] Toyota Information System VIN record **(Tab 1)**
[2] Toyota Safety; Smart Stop Technology; Toyota Motor Sales U.S.A. **(Tab 2)**

foot was on the brake, when the vehicle surged forward and crashed into an unoccupied parked Jeep in front of it.[3] Fortunately, no one was injured.

On June 24, Toyota inspected the vehicle, which included a test drive, a physical inspection of the floor mat and accelerator pedal, and a download of the vehicle's Event Data Recorder (EDR) to capture the pre-crash data. The latter was specifically at Toyota's request, and we had to sign permission slips from Toyota and Bosch, the EDR reader's manufacturer, to allow that portion of the inspection to occur.[4] We were fortunate – many parking lot crashes do not generate enough force to activate the EDR, and others produce inconclusive EDR results. The EDR investigation report clearly showed that at the moment the airbag module made the decision whether to deploy (about the time of the impact), the voltage to the accelerator pedal was .78 (at idle),[5] [6] the brake was engaged, yet both the speed of the vehicle and engine RPM's had doubled in less than 2 seconds.[7]

This second-by-second snapshot is entirely consistent with my wife's account of the events leading to the crash. Likewise, a witness in the front seat observed my wife's foot on the brake as the vehicle surged forward. And yet, Toyota declined to take any responsibility for the vehicle's malfunction. In a July 9 letter denying our requests to be made whole,[8] Toyota Legal Claims Administrator Donald Beierschmitt noted the results of the physical inspection and the test drive:

> The accelerator pedal was thoroughly inspected and found to move smoothly with no restrictions or binding. There was no interference or obstruction found with the operation of the accelerator pedal. When the accelerator pedal was released it would always return to the idle position. The brake components were in good condition with no damage or leaks. The floor mat was properly anchored. The vehicle was test driven for 16 miles, at various speeds and road conditions with several accelerating and braking maneuvers being conducted and all systems performed properly with no unusual or unexpected reactions observed.[9]

However, Mr. Beierschmitt made no reference to the EDR readout, and concluded: "Based on our inspection of your vehicle it has been determined the incident was not the result of any type of manufacturing or design defect."[10] I followed up with a company representative to ask about this obvious omission. Toyota's representative Ronald Inton, while conceding that the results of the EDR readout were not considered, refused to address the glaring conflict between the black box evidence, which contemporaneously affirmed my wife's experience in the Corolla, and the inspector's observations gathered on a short test drive.[11] The mendacity of this omission is

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[3] Report 14-372-AC ; Bristol Police; State of Rhode Island Uniform Crash Report; June 8, 2014 **(Tab 3)**
[4] Toyota EDR Data Imaging Investigation Record; Toyota Motor Sales, U.S.A. **(Tab 4)**
[5] Evaluation of Camry HS-CAN Pre-Crash Data; Roger Brown and Samuel White; SAE International; April 16, 2012 **(Tab 5)**
[6] Confirmation of Toyota EDR Pre-crash Data; Roger Brown and Lance Lewis; Toyota Motor Sales, et al; April 16, 2012 **(Tab 6)**
[7] Crash Retrieval Data for VIN 2T1BU4EE0[redacted] PDF Pg. 7; [redacted]; June 24, 2014 **(Tab 7)**
[8] Letter to Toyota Motor Sales USA; Robert Ruginis; June 12, 2014 **(Tab 8)**
[9] Re: Date of Loss June 8, 2014; Letter to Robert Ruginis; July 9, 2014 **(Tab 9)**
[10] Re: Date of Loss June 8, 2014; Letter to Robert Ruginis; July 9, 2014 **(Tab 9)**
[11] FAX to Ronald Inton; Robert Ruginis; July 30, 2014 **(Tab 10)**

underscored by Toyota's public statements that its EDR reads pre-crash data accurately. In a 2012 technical paper published by SAE International, Toyota researchers concluded:

> For the three vehicle models tested, the Toyota EDR pre-crash data and other parameters were accurate when compared with the HS-CAN data or observations. Based on the testing and analysis performed for this study, the Bosch CDR readout tool for Toyota vehicles can increase the understanding of vehicle crashes and help advance safety research and investigations.[12]

I request that the Office of Defects Investigation examine this defect for several reasons:

The EDR results suggest that unsafe and unexpected engine surges can occur even when the driver's action is to apply the brake.

According to my research, Toyota has defended its system by claiming that the brakes always overcome the throttle. In its tests of Toyota's brake systems, NHTSA stated "three general factors are identified that may affect brake effectiveness during a UA event: (1) brake *malfunction; (2) brake fade; or (3) reduced vacuum assist not related to a malfunction.* Brake malfunction is the only one of these factors that could affect brake effectiveness on the initial brake application in a UA event. No evidence of such malfunctions has been found in post-incident inspections and service of vehicles involved in UA events."[13] The EDR readout of my wife's crash shows that the application of the brake did not stop the unexpected engine surge. At about the time of impact, the accelerator pedal was at idle; the brake was engaged, but the speed of the vehicle doubled. Toyota found the floor mats properly secured and the accelerator pedal properly functioning. What can account for these contradictory findings?

NHTSA has never investigated surges in low-speed crashes in Toyotas

NHTSA's partnership research project with NASA's Engineering Safety Center focused on high-speed UA events and did not focus on surges in low-speed incidents/crashes.

The observations of software expert Michael Barr suggest that Toyota's electronic architecture has many vulnerabilities

Software expert Michael Barr appears to be the only outside expert who has examined the entirety of Toyota's source code line by line. In contrast, the NASA Engineering Safety Center studied Toyota's source code by using "model-based design techniques to create high-fidelity models of the software functions and behaviors."[14] In *Bookout v. Toyota*, software expert Michael Barr spent 18 months with a team of embedded software experts in a secured facility

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[12] Confirmation of Toyota EDR Pre-crash Data; Roger Brown and Lance Lewis; Toyota Motor Sales, et al; April 16, 2012 **(Tab 6)**

[13] Technical Assessment of Toyota Electronic Throttle Control (ETC) Systems; Pg. 31; National Highway Traffic Safety Administration; February 2011 **(Tab 11)**

[14] Technical Support to the National Highway Traffic Safety Administration (NHTSA) on the Reported Toyota Motor Corporation (TMC) Unintended Acceleration (UA) Investigation; Pg. 22; NESC; January 18, 2011 **(Tab 12)**

going through the entire source code for Toyota vehicles with electronic throttle control systems from the 2002-2010 model years. This more thorough assessment found:

- Toyota's ETCS source code is of unreasonable quality
- Toyota's source code is defective and contains bugs, including bugs that can cause unintended acceleration
- Code quality metrics predict presence of additional bugs
- Toyota's failsafes are defective and inadequate
- "House of cards" safety architecture [15]

This suggests the floor mats and sticky accelerator pedals are ***not*** the only causes of unintended low-speed surges in Toyota vehicles.

Unintended surges in low-speed parking scenarios are common

My wife's crash mirrors those of many Toyota owners who have lodged complaints with your agency. NHTSA's study, in partnership with the NASA Engineering Safety Center, determined that unintended acceleration in parking scenarios, they were the most common:

> Further review of the stationary and low speed incidents (combined) found that parking lot entry and exit accounted for the largest share of these incidents (40% of VOQs 64% of crashes. Many of the parking maneuver narratives reported incidents characterized by high engine power either after the driver applied the brake or immediately after shifting the transmission." [16]

I reviewed the complaints made to NHTSA by owners of 2006-2010 Toyota Corollas found 163 reports in which the driver experienced a surge at low speed or no speed; 99 drivers mentioned that the brakes were already depressed when the surge occurred or the surge occurred when the brakes were depressed; 83 incidents resulted in crashes. Many mentioned having had the floor mat and pedal recalls performed before the incident occurred and many described incidents exactly like my wife's, following are few examples:

- Tl*the contact owns a 2007 Toyota Corolla. While driving 2 mph attempting to park and when the brakes were applied, the vehicle suddenly surged forward without warning. In order to stop the acceleration, the contact had to apply extreme pressure to the brakes. The vehicle was not taken to the dealer for diagnostic testing. Three people drive the vehicle and all of them have experienced the unintended acceleration at different times.

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[15] Bookout v. Toyota; 2005 Camry L4 Software Analysis; Michael Barr; Slide Presentation; 2014 **(Tab 13)**

[16] Technical Assessment of Toyota Electronic Throttle Control (ETC) Systems; Pg. 31; National Highway Traffic Safety Administration; February 2011 **(Tab 11)**

The vin was not available. The approximate current and failure mileages were 40,000. Updated 04/22/10 *bf updated 05/05/10.*jb[17]

- The contact owns a 2009 Toyota Corolla. The contact stated while attempting to park with the brakes depressed, the vehicle abnormally accelerated. The vehicle went over the pavement and caused the drivers side front tire to blow out. The manufacturer advised an investigator would further inspect the vehicle. Before the failure, the contact stated when depressing the accelerator pedal, there was an unusual noise coming from the front end of the vehicle and the dealer tightened the accelerator pedal. The contact believed the repair potentially contributed to the failure. The failure and current mileages were 12,015.[18]

- Tl* the contact owns a 2009 Toyota Corolla. The contact stated that he previously received repairs to the accelerator pedal under NHTSA recall campaign id number 10v017000 (vehicle speed control, accelerator pedal). While driving at relatively low speeds of 3 mph and depressing the brakes, the vehicle abnormally accelerated. The contact shifted the vehicle into neutral and was able to stop the vehicle when the brakes were applied. The dealer was performing a diagnostic test on the vehicle when the complaint was filed. The failure and current mileages were 57,000.[19]

- The contact owns a 2010 Toyota Corolla. The contact stated that while turning into a parking lot with his foot on the brake all of a sudden the vehicle accelerated on it's own while his foot was on the brake pedal. The vehicle barely missed striking a pedestrian and then crashed into a convenience store wall. The crash was recorded on the store video camera. Toyota was contacted and filed case # 1008061785. This is the third occurrence and happened two times before the recall remedy for NHTSA campaign ID number: 10v023000, vehicle speed control accelerator pedal and the third failure occurred after the recall remedy was issued. The vehicle was at the contacts residence and will not be driven. The VIN was not available. The current and failure mileages were approximately 9,000. Updated 11/05/10. *lj[20]

- Toyota 2010 Corolla. Sudden accelerator problem: After having the recall update to our Corolla, a few months later, we experienced a sudden acceleration problem with our car. From a parked position next to the curb, we put our foot on the brake and then put the car in reverse to back away from the car in front of us, and the car suddenly accelerated and proceeded to jump over a curb and hit a tree next to us on the side walk. Again, this was when the car was in reverse, so the acceleration was going backwards, with our foot on the brake. After taking our car to the Toyota dealership for consultation on sept 7th, they indicate that they could not find anything wrong with the car and we would need to contact Toyota directly on this problem. It is now nearly a month later, and we still have not been "visited" by the Toyota engineering team. We were assigned a case number by

[17] VOQ 10327623 **(Tab 14)**
[18] VOQ 10329537 **(Tab 15)**
[19] VOQ 10330952 **(Tab 16)**
[20] VOQ 10348120 **(Tab 17)**

Toyota and told to wait to hear from them. We are still without our car and waiting some kind of formal inspection from the Toyota corporate team. The local Toyota dealer is trying to help as well and is also contacting Toyota corporate for assistance. This is not fair to be without our car and some reassurance from Toyota that this won't happened again to our car. As of this date October 1, 2010, no inspection has taken place on our car. We're still waiting. *tr[21]

Surges in low-speed parking scenarios are a safety problem

Surges in parking situations can be deadly to passing pedestrians, drivers and passengers. There have been fatalities reported in situations where pedestrians were crossing in front of or behind a Toyota when the car surged. To be clear, I am not claiming that a defect caused these particular incidents. I mention them only to illustrate that any uncontrolled acceleration -engine torque transmitted to the wheels of a vehicle--while parking is as much a safety problem as one at high speed.

- In April 2012, a 26-year-old bicyclist who was struck and killed by the driver of a 2012 Camry, who according to police was halfway out of the space and stopped, when the vehicle suddenly accelerated.[22]
- [redacted] 2002 Camry XLE, suddenly accelerated off the fourth floor of a casino parking garage. Two witnesses stated that they saw the Camry was easing into a space and come to a stop, with the brake lights on) when the vehicle suddenly surged forward.[23]

The 83 crashes resulting from incidents involving low-speed surge incidents in 2006-2010 Corollas, caused 34 injuries. These crashes and injuries occurred because the driver is maneuvering in tight quarters; the odds of hitting something or someone are high and the ability to stop the vehicle even when a braking system is fully functional is greatly diminished.

Thank you for considering my petition. I look forward to speaking with your investigators.

Sincerely,

[redacted]

Robert Ruginis

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[21] VOQ 10358767 **(Tab 18)**

[22] UPDATE: Whittier bicyclist killed by driver at Celebrity Burgers parking lot identified; Whittier Daily News; April 4, 2010 **(Tab 19)**

[23] Yago Accident Report; State of Nevada Accident Report; April 22, 2010 **(Tab 20)**