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Unintentional Vehicle System Activations

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Background:

Most people hold the steering wheel in a 10–2 or 9–3 hand position as guidelines state. Also, vehicle advancement and customer satisfaction reports are indicating that more buttons/switches are being implemented on the steering wheel trying to make actuation of buttons/switches quick to reach as well as easy to use. For example, there are good number of switches (soft or hard) integrated in the steering wheel for vehicle controls, such as Adaptive Cruise Control (ACC), accessories control (e.g., radio, telephone, etc.,), and other interior surfaces that also contain vehicle switches such as window and door actuators.

While a driver maneuvers a vehicle, the driver's hands may accidently bump some of the buttons on the steering wheel or near it, and as a result, various scenarios can occur and influence a vehicle system. For example, the driver's left hand can accidentally bump the ACC button activating the system, or accidentally bump a heated seat button for non-occupied seats.

Similar scenarios could happen to other vehicle buttons where a user's hand, knee, devices, etc., might bump or push a button by mistake on the IP, doors, or other respective surfaces.

Unintended activation of certain cabin features can lead to undesired consequences such as increase in fuel/electric battery consumption, uncomfortable drive, wear/tear of moving parts, NVH.

Method:

This method as illustrated in figure 1, creates an improved user experience for vehicle operation leveraging existing vehicle technology, such as AI/ML algorithms that learn the driving patterns and predict movements of the key body segments during various driving maneuvers. For example, the method learns how the driver is handling the steering wheel, determines when the driver "pushes/pulls" on the steering wheel, and predicts if touching a specific switch was unintentional. Likewise, AI/ML algorithms can be applied to the driver Foot-Pedal interaction and other key body segments (head, eyes, knee, shoulder, etc.,).

To learn the movement of a driver's hand and/or key body segments, both external and internal cameras and sensor data will be utilized. The surrounding vehicle data will be used to identify driving environment, such as, traffic lights, stop signs, traffic density, objects on road, memorized/known route, and other relevant scenarios that affect the vehicle maneuvering (e.g., reduce speed, steering, signal lights, etc.,). Similarly, the interior cameras and other sensing data will be used to detect the driver's key body segments (hands, knee, foot, head, shoulders, etc.,). Then, the driver's predicted body movements are correlated with the anticipated vehicle maneuvers to predict the unintentional vehicle system activation.

Whenever a system wakes up or is triggered, the method evaluates the surrounding vehicle data and driving patterns, then predicts the next driving action or movement as well as a respective potential body segment position. The wake-up criteria can be triggered based on observed road conditions, signs,

or commanded by driver. If, for example, the interior camera detects a hand position during a maneuver that results in a driving scenario that is not typical for the driver to warrant an activation, then a message (text or audio) prompts the driver to confirm that feature activation is correct or if it was unintentional.

The driver response can be to either continue the interaction with the button (for example pushing on the button) or move the hand if it was an unintended interaction.

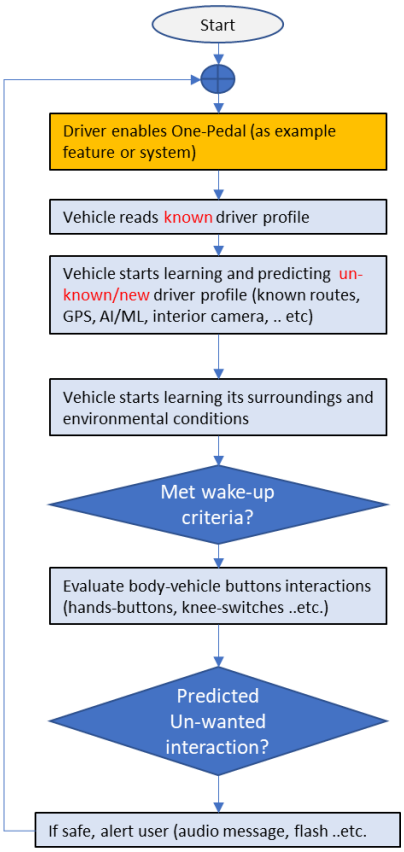

Figure 1 : Illustration of the methodology

Advantages:

The method predicts unintended driver-vehicle interactions. It also continues learning any new pattern of driver's behavior dynamically (e.g., steering, pushing/pulling on pedal, etc.).

The method benefits various users, especially, those with individualized driving habits; and can be transferred to a new car or a shared car where a respective user might have a different arrangement of buttons (e.g., rentals or fleet units).

Disclosed anonymously