THE RIGHT WAY TO ASSESS SAFETY IN THE AGE OF AUTOMATED VEHICLES

Self-driving cars have captured the public's imagination and represent one of the greatest symbols of the IoT Next Industrial Revolution. Soon, automated vehicles (AV) will get people and goods from point A to point B at a degree of speed, efficiency, availability and safety never imagined. The potential benefits of AV have been well-documented, including the reduction or even elimination of accidents, traffic congestion or the need to waste valuable space on roads or parking. But in the mundane reality of the present day, three barriers to AV deployments impede the advancement of AV technology beyond cost and access to technology. These are the presence of outdated regulations, the overlapping jurisdiction over roadways by different agencies and government entities, and the lack of access to vital data that support the advancement of AV technology.

Overcoming these barriers requires a new way of thinking. This is especially true for safety, the largest concern for AV technology. Recent high-profile, fatal accidents have placed safety at the center of AV technology development. Society's approach to safety was conceived in an industrial age of human-operated, unconnected, gas-powered vehicles, and not for mobility in the connected world of automated vehicles and intelligent transportation infrastructure we are seeking to create. As a result, current rules, regulations and testing based solely on human requirements for operational safety, without adequate consideration of computer control, are outdated and place the fulfillment of the research necessary to advance AV technology at odds with public policy. For example, state law requires drivers to keep their hands on the steering wheel. This law inadvertently prohibits the open-road testing of self-driving or driverless vehicles which may have no steering wheel at all.

We believe it is possible to advance applied AV technology research without sacrificing public safety if we consider that desired safety outcomes can be quantified along four dimensions. These are:

Tactical Maneuver Behaviors
This is measuring safety during such tactical vehicle operations as parking or backing; maintaining or adjusting speed; car following; and lane keeping and centering.

Operational Design Domain
This is measuring safety regarding the physical infrastructure, operational constraints, objects, connectivity, environmental conditions, of the vehicle.

Object and Event Detection and Response
This is measuring safety as it relates to a vehicle's ability to detect and respond to such relevant pathway elements as pedestrians, pedal cyclists, speed-limit changes, encroaching or oncoming or adjacent vehicles, following vehicles, relevant stopped vehicles, and others.

Fail Mode Behaviors
This is measuring efficacy of fail-mode behaviors, such as fail-operational; hardware and software redundancy; adaptive compensation; degraded operations and fail-safe; stop in lane of travel; move out of travel lane and stop and/or park; transition to fallback-ready user, and other critical operations.

The four dimensions of AV system safety can be measured and proven while conducting simulations of AV systems and open- and closed-road testing. Adopting a new approach toward required safety outcomes of computer control will provide industry participants and stakeholders a path forward.

Global Dynamic Group, LLC
40 Wall Street, 28th Floor
New York, NY 10005

GDG

+1 (347) 767-5453
info@GDGIoT.com
www.GDGIoT.com