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RESEARCH REPORT

Unsettled Domains Concerning Autonomous System Validation and Verification Processes

Fabio Alonso da Silva

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SAE EDGE™ Research Reports provide state-of-the-art and state-of-the -industry examinations of the most significant topics in mobility engineering. SAE EDGE™ contributors are experts from research, academia, and industry who have come together to explore and define the most critical advancements, challenges, and future direction in areas such as vehicle automation, unmanned aircraft, Internet of Things and connectivity, cybersecurity, advanced propulsion, and advanced manufacturing.

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About the Editor

Fabio Alonso da Silva is currently the Head of Systems at ElletroCrafts Aerospace Ind., a mobility startup tasked with developing an urban air mobility vehicle or "flying car." Additionally, da Silva is pursuing an MBA at the Warwick Business School/University of Warwick, UK.

With more than 20 years of experience in systems engineering, development, integration, and product sustainment, da Silva has worked at Embraer, Bombardier, Gulfstream, and recently Zoox, an automated driving system company. His professional journey has focused on development of fly-by-wire aircraft systems and autonomous systems for autonomous vehicles [1].

Da Silva is dedicated to the deployment of safe solutions for autonomous systems and made his mission to contribute to the discussion of the creation of a framework that would support obtaining safety clearance of such systems. He combines perspectives from technology, business, and vehicle certification.

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Unsettled Domains Concerning Autonomous System Validation and Verification Processes

Abstract

The Federal Aviation Administration (FAA) and the Department of Transportation's (DOT's) National Highway Traffic Safety Administration (NHTSA) face similar challenges regarding the regulation of autonomous systems powered by artificial intelligence (AI) algorithms that replace the human factor in the decision-making process. Validation and verification (V&V) processes contribute to implementation of correct system requirements and the development life cycle - starting with the definition of regulatory, marketing, operational, performance, and safety requirements. The V&V process is one of the steps of a development life cycle starting with the definition of regulatory, marketing, operational, performance, and safety requirements. They define what a product is, and they flow down into lower level requirements defining control architectures, hardware, and software. The industry is attempting to define regulatory requirements and a framework to gain safety clearance of such products. This report suggests a regulatory text and a safety and V&V approach from an aerospace engineering perspective assessing the replacement of the human driver from the decision-making role by a computational system. It also suggests an approach where aerospace guidelines can be used alongside the International Organization for Standardization (ISO) standard ISO 26262 in order to define a viable and valuable framework for autonomous systems safety clearance (or certification).

NOTE: SAE EDGE™ Research Reports are intended to identify and illuminate key issues in emerging, but still unsettled, technologies of interest to the mobility industry. The goal of SAE EDGE™ Research Reports is to stimulate discussion and work in the hope of promoting and speeding resolution of identified issues. SAE EDGE™ Research Reports are not intended to resolve the issues they identify or close any topic to further scrutiny.

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