

ASAM OpenX standards for off-road applications

Summary from the workshop on Mar 23, 2023

ASAM held a workshop in late February on applications of its OpenX standards for domains other than on-road driving. The goal of the workshop was to take a first step in bringing the different industries together, to better understand the respective use cases that they have, their pain points and the potential of the OpenX standards to address or begin addressing these.

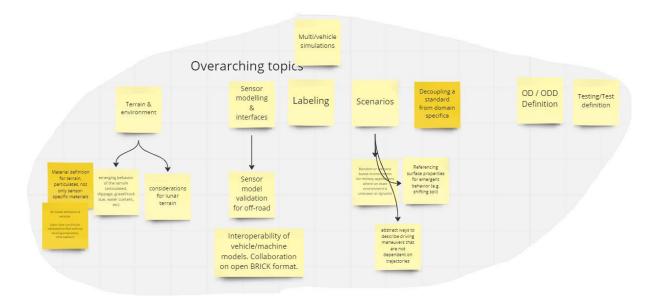
The workshop began with some insights by participants into where they see overlaps between the current use cases of OpenX standards and those of other domains, as well as how these standards are already being used for such use cases. Yoav Hollander (Foretellix) gave some thoughts on the connection between off-road applications and ASAM OpenSCENARIO 2 and how it is already being used for mining applications. Dr Marcos Nieto (Vicomtech) presented off-road labelling use cases in different sectors such as agriculture, railway, surveillance, and others while stating that extensions of OpenLABEL v1.X may help to address sector-specific use cases. Then Dr Philipp Rosenberger (Persival) talked about ASAM OSI (Open Simulation Interface) and their usage for multiple domains. Further talks revolved around synthetic data for off-road vehicles, simulation-driven machine learning and challenges within the aerospace industry and a scenario-based approach in aerospace.

The group collected an initial set of use cases from their respective areas on a Miro Board (See screenshot from MIRO board below).

			physics based sensor simulation	model validation for off-road applications	requirements. application examples. pilosing projects			
omain	Goal (what do you want to	Challenges						
	achieve)	/ limitations	High fidelity physics simulation	Trust in validation	Realistic vehicle terrain interaction	Robot	Development and evaluation of Robot with ground and evironement by simulation	and action for walking and complex irregular 3D environment
rospece/ ronautics	Build a verification pipeline	OpenX standards not directly compatible with modifications median modifications median	Private areas	Define objects/topology/maneu vers for "private areas"	Is this already "all" covered by things that OSC1/2x already are			
	Standards- driven workflow			such as private property	capable of?	International market	Are there any international specialities that we have to cover/include?	Normally, we "limit" ourselves to GER/UK/US, but CN/INDIA are also important for example
	Having scenario descriptions that		Off-road	*Free* maneuvers and abstraction of trajectories for off-road scenarios	Right now there is no abstraction besides of concrete trajectories		nave to covernincipoer	ingoronis tor example
Mining	Includes vehicle dynamics and emerging behavior of the terrain (erriculterd, slippage, spewi/rock size, water content, etc)	_	General	scenarios across various industries	1. Various industry standards 2. reusability 3. Varios solchain 4. Process differences	Vehicle Model	How to achive high fidelity vehicle model (CAD based),	
truction	Build or expand scenario description for domain: Terrain in general (slopes, escarpments, pits) + beinvior of terrain (groungypes,	Which Simulator? Environment and physics in Simulation? Detailed Environment	Construction	Solve and certify work tasks for autonomous construction, aka	Lacking framework for formulating standard			
nd military	follage, weather) +vehicle trajectories	with mistellaneous? How is the simulation validated?		scenarios++ Interoperability	tasks - and goals.	Off-Road	Having a description for the surface and the scenario for different Off-Road applications like agriculture/ mining	Description of surfa e.g. with soft soil u: cases and correspond scenarios.
	Development and evaluation		Off-road	terrain models.	ontology and format for this.		(including objects, obstacles)	scenarios.
litary .	of autonomous ground and air vehicles by simulation of performance of multi-domain operations	Environment attribution, sensor models capture details of interaction with terrain and vegetation, vehicle dynamics, physics of vehicle interactions with terrain and vegetation, complex 3D terrain; mobility in now and water	Aerospace Lunar	Need Lunar framework for the EU/ESA Moonight and Lunar base projects!	Simulation is mission critical for Moonlight	AJ Explainability	A standard environment able to test an Al, with syntethic or real sensor data, to see how the Al reacted in a given	
			Off-road	Interoperability of vehicle/machine models. Collaboration on open BRICK format.	Physics is essential for everything off- road.		situation	

A series of reoccurring topics were also identified (see screenshot below).





These topics included the definition and modelling of terrain for non-on-road applications, for example, particle-based or soft terrain or more detailed vegetation modelling. A strong theme was scenario descriptions for other applications that are not covered in the current OpenSCENARIO domain model, for example, the manipulation of servos in heavy machinery. Another topic collected was sensor modelling and packaging for off-road applications, with a particular focus on the modelling of sensor degradation. To investigate these items further, it was decided that a concept project under ASAM will be initiated. This concept project will target the aforementioned items through the development of a Proof of Concept (PoC). This PoC will demonstrate the application of the OpenX standards for one or more selected use cases. Gaps, where the standards are insufficient or do not address the domain-specific concepts will be conceptually represented.

To begin working towards the goal of initiating a concept project, a follow-up meeting will be set for March to discuss the process and additional boundary conditions. The date for this is still being set via separate communication with the participants of the workshop. If this follow-up is something you or your company would be interested in joining, please reach out to us!

The next workshop is foreseen for Mar 20, 2023 | 9:00 am - 11:00 CET

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