PROGRESSING THE AI ENABLED DIGITAL TWIN: EMPOWERING PORTS

Interview with Dr. Rafiq Swash, CEO and Founder, Aidrivers Ltd

Speaking to PTI, Dr. Rafiq Swash, CEO and Founder, Aidrivers, highlighted the transformative effects autonomous driving and Ai enabled digital twin insights can provide for ports and terminals.

A digital twin is a digital representation, or 'twin', of a physical object with the real world behaviour achieved using Ai based true cognitive or system can take whole components of a physical entity – such as a port complex or terminal – and virtually map that body into a 3D interface or provide organised datasets for the user. Aidrivers combines that visualised technology with any operative object in a terminal yard to provide huge benefits to the end user.

Dr. Swash brings his expertise on connectivity, scalability, and the sky-high potential for the company following Prime Minister Boris Johnson's visit to Aidrivers offices earlier this year.

HOW DOES AIDRIVERS' TECHNOLOGY BUILD ON THE TRADITIONAL DIGITAL TWIN?

Aidrivers has approached the idea of a digital twin from a simulation perspective that provides the real world behaviour and cognitive.

We came to a digital twin beyond the classical digital twin – beyond visualisation and maintenance – as we are working on Ai-enabled autonomous mobility handling automation.

In other digital twin and simulation software, every object is fixed or based on a fixed concept. In our case, we provide Ai-enabled algorithms behind every single object – for example an autonomous crane or truck, adding environmental and behavioural characteristics where we can provide both the mirroring of that object and the rescaling the data of autonomous objects.

In the case of vehicles, we upgrade them by adding an autonomous capability to them, allowing them to operate in three different modes of autonomous, remote and manual driving as we do not take away existing experience. Then, in order to operate the vehicles, we add required necessary hardware sensors to transfer onto our 3D digital twin environment.

We can then add daily terminal data such as traffic flow, row segments, weather characteristics, or traffic rate, allowing everything to become more real. What this means is our digital twin has centimeter accuracy to a real environment, meaning terminals can place a virtual truck anywhere in the 3D environment, and drive that truck to solve problems.

Because we have sensors understanding the characteristics of a terminal and the equipment fleet using them, we can offer a seamless deployment and integration of our workflow. When we visit a terminal,

we can then receive data from manual drivers for areas that we cannot simulate such as a traffic light or a camera – to then add to our 3D environment – leaving us with no surprises.

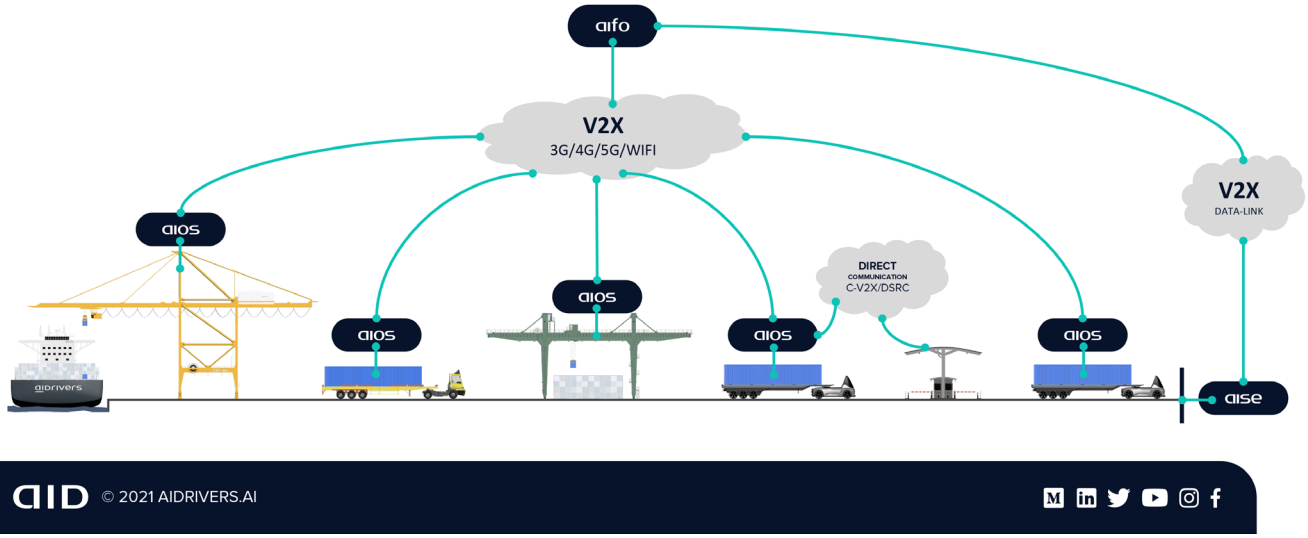
WHAT ARE THE BENEFITS?

One of the problems that current terminals face is being unable to identify bottlenecks in their operations. A 3D simulation with autonomous cognition based on the real-world environment allows the identification of the real issues through capture of that relative environment.

Our 3D simulation and digital twin with autonomous functions can re-process data to identify true problems – such as increases in external traffic or idle time of equipment – that cannot be answered in day-to-day operations. These questions can be answered through autonomous simulations of a terminal yard.

Aidrivers delivers greater efficiencies in operations and deliver on it, because our solutions are based on true 3D physics beyond mirroring or replication.

AIDRIVERS'
OVERALL ARCHITECTURE
FOR SCALABLE ARCHITECTURE



TERMINALS AROUND THE WORLD ARE CONTINUOUSLY GROWING IN CARGO HANDLING EQUIPMENT FLEETS. HOW DOES THIS IMPACT AUTONOMOUS SIMULATION TECHNOLOGIES?

Our system is latency resilient, network independent, and operationally resilient. We have taken the same concept on our simulation approach as well.

Our digital twin is an environment, where the functionality comes from our Ai and autonomous algorithms. If a terminal operator has 100 trucks, for example, our solution would mean that every truck is 'driven' by an independent computing AIOS board (Artificial Intelligence Operating System) or AI Driver for its operations.

Then we have that 'real world' experience: we take individual pieces of equipment and connect them to the 3D digital twin pieces of equipment: so every crane, truck, and traffic light, for example, has its own services and cloud system.

This means that our digital twin 3D environment acts just like a normal terminal. If you add more cranes, we add its AIOS engine behind that crane to decouple the 3D environment from the previous equipment fleet of a terminal. Our architecture is scalable to be able simulate any terminal size and fleet size.

HOW MUCH OF AN IMPACT DOES IMPROVED CONNECTIVITY – THROUGH 5G OR 4G LTE NETWORKS – IMPACT AUTONOMOUS SIMULATION-BASED DIGITAL TWINS?

Aidrivers systems are designed to be network resilient: we want to deploy systems with the current network infrastructure without a need of any infrastructure upgrade or environment changes. We use Ai-enabled algorithms accommodate and to cope with network latency without affecting autonomous operations and safety.

Today we can scale our system to as many as few thousand vehicles without having network issues. It's not about generating sustainable connectivity, it's all about creating sustainable consumption.

To me, 5G is not an answer for sustainable automation: if terminal operators want to automate, they need to have infrastructure. 5G connectivity investment could be more expensive than autonomous operations. Aidrivers can automate a fleet of 50 vehicles for a fraction of what a high connectivity wireless network could cost.

We have taken the approach to avoid environment or connectivity upgrades and work with the current connectivity. A network could be 3G, or 4G, but it still provides us with communication for autonomous simulation: because we use it sustainably.

Anybody who wants autonomous solutions from Aidrivers does not need any connectivity upgrades. We can use existing environments and provide automation benefits. We are not going to reinvent the terminal: we want to empower ongoing operations because port operators have spent some 50 years operating in this workflow.

HOW WOULD YOU ADVISE A TERMINAL OPERATOR TO BEING INVESTING IN AUTONOMOUS SIMULATION DIGITAL TWINS? WHAT WOULD YOU RECOMMEND?

The most important thing is making autonomous automation accessible and scalable. Aidrivers solutions are not just compatible with an existing system but forward compatible as well. By utilising

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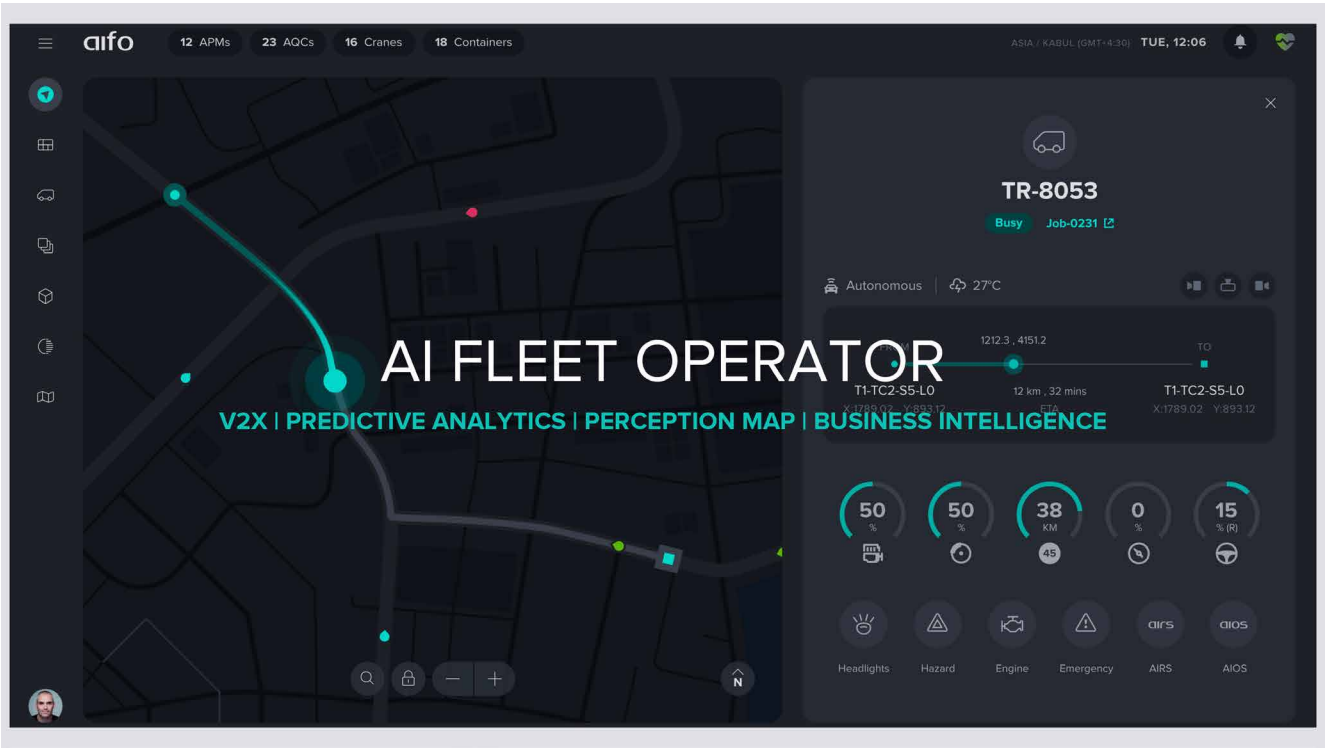

"OUR 3D ENVIRONMENT CAN REPROCESS DATA TO IDENTIFY TRUE PROBLEMS THAT CANNOT BE ANSWERED IN DAY-TO-DAY OPERATIONS."

edge computing through sensors and the existing environment, we can create real and reliable networks to reduce costs.

Connected infrastructure means we can visually map your terminal to the centimeter, and deploy autonomous simulation technologies to better understand your terminal and reduce costs.

Our autonomous mobility solutions with the digital twin could contribute in cost reductions of up to 50%, increasing profit margin considerably. Ports and terminals have historically had a profit margin around 15-20%, which cannot continue because globally more terminals are being built, meaning greater competition and needing for a greater reduction in costs.

We want the supply chain to be more productive, and for vessels to be able to utilise their ships by terminals being more efficient.

UK PRIME MINISTER BORIS JOHNSON VISITED YOUR OFFICES EARLIER THIS YEAR. WHAT WAS THAT LIKE AND WHAT DOES THAT SIGNAL TO THE UK AUTONOMOUS SECTOR?

The UK is known for its inventors. We are the leader in invention and now after Brexit we are independent. The government wants to have better shipping and transportation services, where we are working well – so Aidrivers is a perfect fit.

But we are a global company where we try to meet the global needs. Singapore, Hong Kong, and the United Arab Emirates are all major ports and terminal nations where we provide innovative solutions. He was proud of our global impact of this as a good use case of autonomous technology.

HOW CAN THE UK CONTINUE TO DEVELOP ITS AUTONOMOUS INDUSTRY, IN YOUR OPINION?

We need to look at the commercialisation element of autonomous technologies on the global trading stage to create true value for companies.

We need to implement effective automation in our industry to sustain the digital economy and thus we need to get faster in terms of regulating autonomous vehicles in our local operations; I would like to see that decision be made faster in terms of licensing autonomous vehicles and AI technologies, giving us the opportunity to implement them in the UK and with UK businesses.

The UK is a prime location for talent, with global top 10 universities well ahead from the world. We need to think commercially to develop our skills and implement technologies here to set the example on the world stage.

ABOUT THE AUTHOR

AIDrivers' founder Dr Rafiq Swash of Brunel University London contributes to international research in AI, visual information search and retrieval, computer vision, 3D sensors, predictive data analytics and automation. Professionally this has expanded into further international leading collaborations in connected robotics, AI-enabled automation, sensor intelligence and fusion, digitisation and behaviour and pattern modelling.

ABOUT THE ORGANISATION

AIDrivers provide specialised AI-enabled autonomous mobility solutions for port terminal automation that meet the needs of port operators. The company is working passionately to address industrial mobility challenges by optimising industrial operations and improving the quality of service towards a sustainable future.