# IRRB Webinar on CES Trends

what are the possible applications for the rail sector

11 July 2023

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# CES LAS VEGAS 2023
## UIC TECHNICAL REPORT

## INTRODUCTION SPEECH BY Mr BHUTANI

# CES LAS VEGAS 2023
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# Mobile LOOV CEO

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# Francis BEDEL
# UIC Digital

# CES LAS VEGAS – A FEW FIGURES

In **2023**, the CES took place from 6 to 9 January

It expected:
- More than **170,000 visitors**
- Including more than **4,500 exhibitors** and more than **1,700 start-ups**

The fair welcomed more than **3,600 media** from all over the world

Over **20,000 different products and technologies** were **displayed** at the exhibition
Over **1,800 conferences** and **presentations** took place during the event

Additionally, CES 2023 hosted:
- More than **500 business executives**
- More than 2,000 investors.

Finally, CES 2023 was the **largest consumer electronics show ever** with **over 2 million square feet** of exhibit space

# UIC PRESENCE AT CES LAS VEGAS
## BEFORE AND NOW

**2017: first participation at CES Las Vegas**

Active participation in CES Government

**2017 – 2022**

**Present every year**

Advocating and enhancing the position of Rail in the mobility panel

**2023**

**For the very first time**, **UIC** has **a booth at CES Las Vegas**

UIC invited two startups to join

**2024**

UIC will have its own booth at CES WEB 3.0 village

Invitation to UIC Members to visit us and to join

# Christian CHAVANEL
# UIC Rail System Director

# CES LAS VEGAS
## MAIN INNOVATION TRENDS IN 2022 (1/2)

## From a railway sector point of view

- Growing contribution of **5G**

- Increased **Cloud Infrastructure**

- **Deeper AI Innovations**
  - **Natural Language Processing** (NLP)
  - **Computer Vision**
  - **Machine Learning** (ML)
  - With **AI Applications** on:
    - **Conversational AI-Humans**
    - **Autonomous Systems**
    - **Metaverse** seemed to become unavoidable

**The Entreprise Experience**
  - **Virtual meetings**
  - **Remote** collaboration
  - **Immersive Design**
  - **Simulations / Digital Twins**
  - **Marketing and Sales**

# CES LAS VEGAS
## MAIN INNOVATION  TRENDS IN 2022 (2/2)

## From a transport point of view

- **Electric Vehicles**
- **Luminar and lidar**: useful for ATO (Automatic Train Operations) for detecting of obstacles on railway tracks
- **Self Driving trucks**
- **Urban Air Mobility**

## Nothing about public transport

Except for bikes and freight logistics of the last mile

## Nothing about railways

## The other main trends

- **Space technologies**
- Sustainable technologies, notably **smart cities**
- **Digital health**, with a specific focus on wearables, which could be useful for **occupational health** for railway staff

# CES LAS VEGAS
## MAIN INNOVATION TRENDS IN 2023

Steve Koenig, VP Research of the Consumer Technology Association, opened CES Las Vegas 2023 with *his "CES 2023 Tech Trends to Watch"* [1]

## Industries are still confronting global challenges

- **Supply chains** remain **vulnerable**
- **Semiconductor demand** stubborns inflation softening
- **Labor shortages**
- **Stubborn inflation** and **rising interest rates**

## Key technology themes of CES 2023

- **Entreprise Tech Innovations**
- **Metaververse / Web 3.0**
- **Transportation and Mobility**
- **Health technology**
- **Sustainability**
- **Gaming and services**

(1): Consumer Technology Association (2023), "CES 2023 Tech Trends to Watch", Online, Available at https://videos.ces.tech/detail/ video/6318202282112/ces-2023-tech-trends-to-watch , (Accessed 4 January 2023)

# Innovations which could be applied in railways

# CES LAS VEGAS
## INNOVATIONS WHICH CAN BE APPLIED IN RAILWAYS (1/2)

**Of all these main trends, the railway sector should carefully monitor potential transfers to railways**

- **5G use cases** and **industrial IoT applications**
- **Connected intelligence**
- **Autonomous systems**
- **Quantum computing**
- **Cybersecurity**
- **Artificial Intelligence** (AI)
- **Robotics**
- **Metaverse of the Things** (MoT)
- **Immersion experience**

(1): Consumer Technology Association (2023), "CES 2023 Tech Trends to Watch", Online, Available at https://videos.ces.tech/detail/ video/6318202282112/ces-2023-tech-trends-to-watch , (Accessed 4 January 2023)

# CES LAS VEGAS
## INNOVATIONS WHICH CAN BE APPLIED IN RAILWAYS (2/2)

**Of all these main trends, the railway sector should carefully monitor potential transfers to railways**

- **Electrification ecosystems**
- **Smart grids**
- **Transformation of the in-vehicle experience**
- Applications for **supply chain**
- Solutions for **clean air and water**
- **Alternative energies**
- **Recycling technologies**
- **Drone** technologies and applications

# Innovations which could be applied in railways
## Security

## Drop Free Glass (DFG)

" is the world's first **electronic self-cleaning technology for optical sensors**

DFG can promptly **remove various contaminants** on the surface of the sensors using an advanced microfluidic technology based on electrowetting-on-dielectric (EWOD) principle. The EWOD-driven DFG has outstanding advantages including fast operation speed (1s), low power consumption (1mW), and high durability (>1,000,000 cycles)

For the first time, the DFG is **applied to AI surveillance cameras** for **daily life safety** and future industries such as smart cities and factories

## DFG-aided outdoor AI surveillance camera can always guarantee clear camera images even during rainfall"

$\Rightarrow$ **Security**
$\Rightarrow$ **Train windows**
$\Rightarrow$ **Locomotive windscreens**
$\Rightarrow$ **Fight against virus**
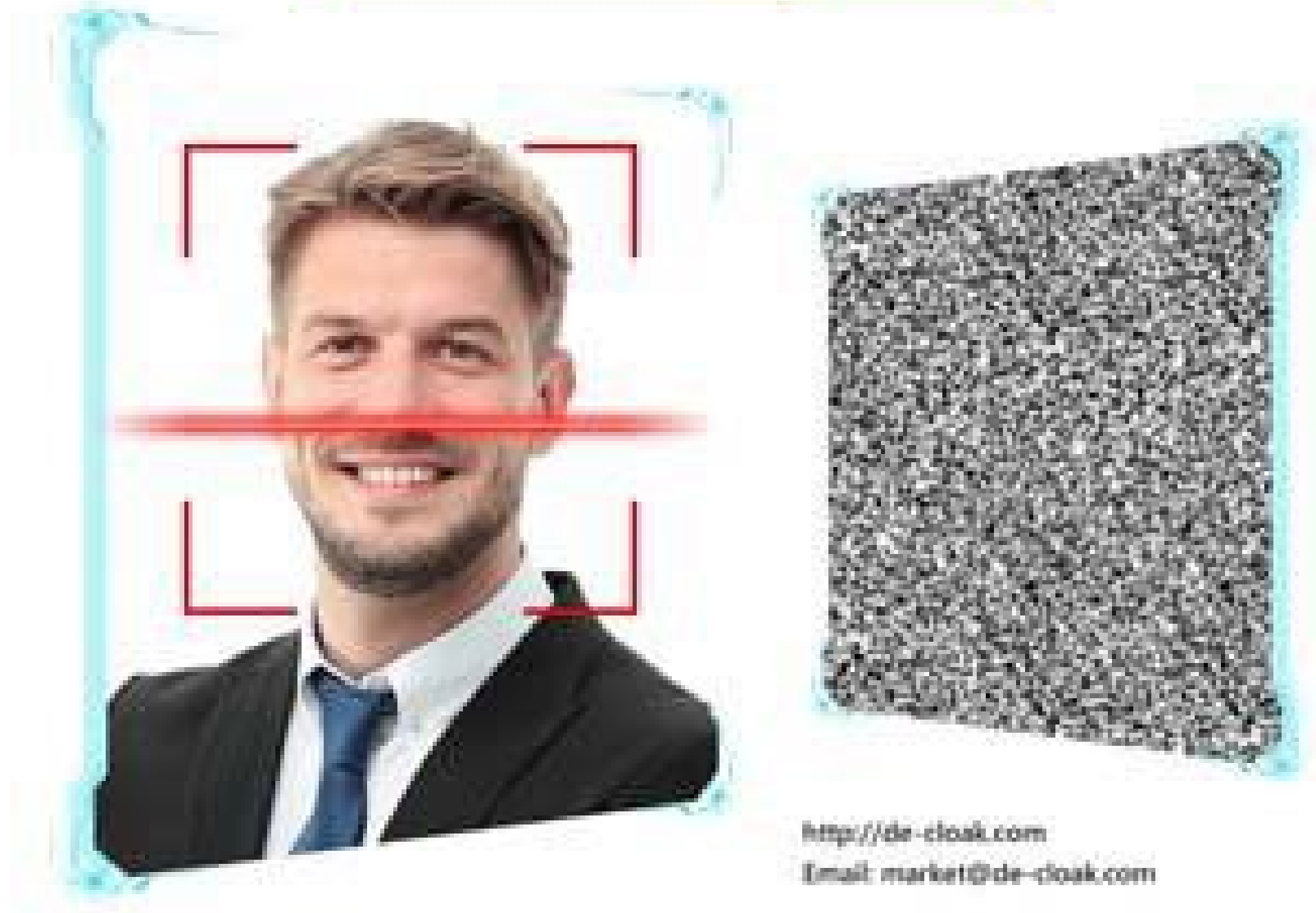
http://de-cloak.com
Email: market@de-cloak.com

# Cybersecurity　& Personal　Privacy

DeCloakFace is a **trustable AI obfuscated image processing** technology for **facial recognition**, which allows the user to conduct **secure identity verification** without leaking personal information

DeCloak, the developer of DeCloakFace is a privacy computing company, which aims to make personal data privacy easy and manageable"

**This innovation could accelerate the access to the trains while improving the respect of the passengers' personal data**

# Night watch by      Nexion   Solutions

"As a solution designed to **prevent further violence and injury**, NightWatch is a **GPS- enabled smartwatch that allows its users to access emergency help from specialized operators**, **who triage crisis events, and then dispatch police or emergency personnel as needed**.

Through its proprietary platform, operators receive detailed information on the specific case for each victim or witness, which allows for better-informed police response

In addition, an **automatic recording of the event** provides an **additional piece of evidence**, which can be used in court to increase the likelihood of a successful conviction."

## Security for front-line staff
## (railway stations, trains, railway police)

## Safee Case By Safee

"Safee is a phone case that conceals an **anti aggression device** that **can be activated in less than 3 seconds** and **offers up to 5 self-defense features**:

1 - The user activates the Safee case by pressing the push button 3 times in a row

2 - The 130 Decibel alarm presents in the case is activated

3 - Start recording with your phone camera and microphone

4 - The application sends an alert to the emergency contacts who can follow live cameras, microphones, & position

5 - Police are on their way, called by the emergency contacts, with all the information needed

## Security for front-line staff

## (railway stations, trains, railway police)

# Innovations which could be applied in railways
# Operations & Safety

# PMCAC  by GLOphotonics

"**Precision-timing atomic-clocks** are at the heart of human-activities with vital and ubiquitous significance in multi-trillion-dollar markets like **cyber-security**, **geopositioning**, **secured 5G telecommunications** and **quantum sensors**

Transcending 20-years of world-leading research in quantum photonics based on its proprietary technology, GLOphotonics unveils Photonic-MicroCell-Atomic-Clock (PMCAC): a **compact and shapeable quantum device that unlocks a paradoxical and overdue situation** and sets the pace for trillion-dollar market and multi-paradigmatic changes. PMCAC is designed **to bring the historical and unequaled scientific laboratory- atomic-clock performances to the consumer's finger tips**"

**Numerous rail applications relies on atomic precision for their accuracy**

**Impact of 5G communications**

**Could be used for geographical positioning**

# Spatial Touch Automotive By Vtouch, Inc.

"SpatialTouch™ makes it **easy and precise to control many in-car functions by simply pointing at them**

It offers a **truly touch-like interface for a 3D space**.

With SpatialTouch™ you can make any real-world objects interactive and you can directly select and control them as well as set them as hyperlink shortcuts.

Single SpatialTouch™ system covers everything in the vehicle, such as the display and buttons, as well as the air vents and sunroof

A **hygienic contactless** solution for passengers in taxi and ride-sharing services

Drivers don't need to look away from the road (just look into peripheral vision or glance)

**Potential applications in train driver's cab to be investigated**

## Driver Monitoring System With Invisible Camera By Behr -Hella Thermocontrol GmbH (BHTC)

"BHTCs' Driver Monitoring System (DMS) allows for **observing the drivers' degree of distraction while driving**

It also **monitors drivers' awareness like eye openness** to **detect potential degrees of fatigue**

Our target is to **decrease fatal accident rates**"

## Potential impacts for staff in charge of safety (train drivers, signalling boxes, dispatchers)

# SomaCap ™by Somalytics , Inc.

Made of a nano-infused paper composite, Somalytics carbon-nanotube paper composite (CPC™) capacitive sensor - SomaCap™ - is the world's smallest nano- based capacitive sensor. Miniature and highly sensitive to the human body, they **can be used for eye tracking, gesture control, touch and fluid monitoring**. SomaCap sensors are designed to improve the human experience through innovations in eye tracking, consumer electronics, AR/VR, the Internet of Things, health and wellness, and transportation.

## Potential impacts for staff in charge of safety (train drivers, signalling boxes, dispatchers)

## Aeries II by Aeva

"It leverages **4D sensor data to deliver new capabilities such as Ultra Resolution, which provides up to 20 times the resolution of legacy**."

**LiDAR sensors, enabling automated vehicles to detect objects** like small road hazards at highway speeds **from up to twice the distance of 3D LiDAR sensors**."

**Technology to be considered for the development of ATO and the detection of obstacles**

## Eyeonic Vision System By SiLC Technologies

"The Eyeonic Vision System is the first ever commercially available FMCW **LiDAR** based on a fully integrated silicon photonics chip (The Eyeonic Vision Chip) solution targeted to applications that use machine vision

The Eyeonic Vision Chip integrates all photonics functions needed to enable a **coherent vision sensor**, offering a tiny footprint while addressing the need for low-cost and low-power

An ultra-low linewidth laser, a semiconductor optical amplifier, Germanium detectors, and meters of optical circuits are integrated onto a silicon photonics chip.

The fully integrated solution provides **high sensitivity which translates to a LiDAR solution with longer range and better precision**."

## To be considered for the development of ATO

## And detection of obstacles

# Innovations which could be applied in railways Infrastructure inspections

## Smart Early Warning System for Predicting Slope Failure By Smart Geotech Co., Ltd

"a smart measurement system that consists of a rod-shaped displacement sensor, Iot client,
 and gateway to measure the slope displacement in the vicinity of the slip surface.
 It is an intelligent sensor- based slope failure early warning system that transmits a real-time warning to the users
if the rate of displacement exceeds the standard value set by the algorithm."

**This innovation could be applied to the embankment monitoring along the tracks**
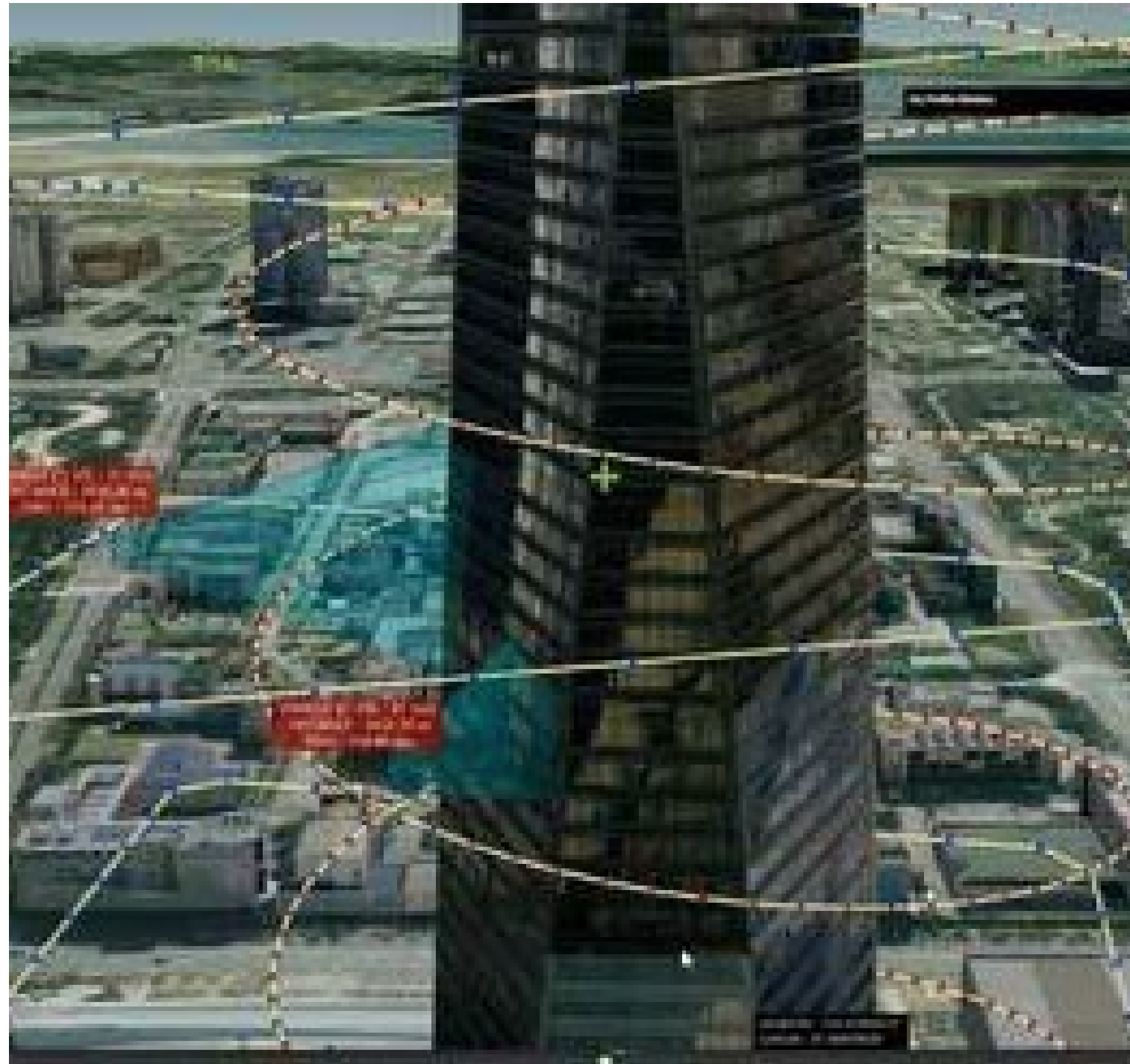
## DROW 4D Lapse By CLROBR

"is a web-based application where **any drone can be autonomize to take photos of objects or buildings for 3D mapping, facility management, or inspection**. Instead of manually setting waypoints, the drone's flight path is automated **using AI and a 3D point cloud of the objec**t.

We capture **4D data, meaning 3D data plus a timelapse of all previous data to note any changes in the object over time**."

**This innovation might lead to an automatization of:**

- **Buildings' inspection**
- **Tracks inspections**
- **Artworks inspections**

**by drones**

# Innovations which could be applied in railways
## Rolling Stock

# Aircore EC By Infinitum

"The Infinitum Aircore EC is **disrupting the motor industry** with its **innovative patented PCB stator and integrated Variable Frequency Drive** (VFD).
Using **lightweight, reusable materials** and **modular design**, Infinitum's motor **generates power in half the weight and size, at a fraction of the carbon footprint and noise of traditional motors**.
With **no iron and 66% less copper**, the Aircore EC can sustainably power commercial and industrial applications, such as **HVAC fans**, pumps and materials handling equipment."

## Could be of interest to:
- **Reduce weight of engines, noise in rolling stocks and therefore to increase the performance and reduce noise**
- **Improve HVAC efficiency and reduce noise**

GREENTRIC ECO 170kV GIS(GREENTRIC Eco170)
By HYUNDAI ELECTRIC & ENERGY SYSTEMS CO., LTD.

"Hyundai Electric & Energy Systems completed the **development of a high-voltage circuit breaker (HVCB)** for the rating of 170 kV, 50 kA, and 60 Hz using $CO_2$ and C4F7N
The HVCB, part of a Gas Insulated Switchgear (GIS) bay of the same voltage rating, is a three-pole operated in one tank encapsulated design that has fulfilled all the IEC 62271-100 tests
Its **performance equals that of SF6 gas** counterpart but **shows a more than 99% reduction of the Global Warming Potential (GWP) of the gas mixture**."

## This high-voltage circuit breaker could be of interest for:

- Electrical substations

- And possibly rolling stocks

# SF (SuperFast) Battery By SK

"This **battery** is manufactured by SK On, using Nickel 83% Cathode which is the highest nickel content.

With the help of SK On's **fast charging protocol**, this **battery** is **charged from 10% to 80% within 18 minutes**

**Quick charging technology** could cause vehicle fires.

Kowever, SK On's has achieved **zero number of vehicle fire**

## To be considered for battery trains

# Innovations which could be applied in railways
# Energy Management

# INTEGRICT Industrial Complex Energy Management System By HYUNDAI ELECTRIC & ENERGY SYSTEMS CO., LTD.

"INTEGRICT Industrial CEMS (**Complex Energy Management System**) is a cloud-based **smart energy platform** that provides total energy management and energy services for factories in industrial complexes.

Unlike the existing Factory Energy Management System (FEMS), CEMS not only **analyzes energy consumption by plant**, process, and facility of each plant but also **performs energy management from the perspective of industrial complexes**.

Furthermore, it **serves as an energy platform** and provides **various services** such as **energy trading, facility maintenance service**, and RE100 consulting through the participation of third parties in the energy sector."

## This realization is applicable for the management of large industrial centers

## EnergyScrum - Energy Management System for DERs By 60Hertz

"Energy Scrum is an **energy management system for Distributed Energy Resources** (DERs)

It can integrate various DERs, including PV, ESS, fuel cells, and EV chargers, into integrated screens and accurately forecast overall energy supply and demand using AI.

Energy Scrum **can orchestrate DERs without cumbersome processes** and **allows users to achieve the goal**, **such as maximizing eco-friendly electricity use through applying user-specific operation scenarios**.

For example, EnergyScrum **can be applied to an old gas station to transform it into an eco- friendly energy station with DERs**

**To be considered for managing a mixed rolling stock fleet (battery, hydrogen, electric, alternative fuels,v and diesel, etc.)**

# Innovations which could be applied in railways
## Railway Stations

# Incheon Airport (South Korea)

Incheon Airport's booth presented a **new paradigm for the airport industry**

The Smart Pass was described. Starting in 2023, **any passenger** at Incheon Airport **can fly safely and securely with a single biometric ID**, **without the need for paper documents**.

Thus, **seamless journey with biometric ID** will be **possible**. Indeed, **once registered, no additional registration is needed from passenger for 5 years**. In addition, a **99.9% accuracy of facial recognition** based on Deepl Learning technology will **enhance security**

The **remote baggage drop-off available at homes and hotels** will be **facilitated by biometric information**. The **wait time** at the check-in counter will then be **minimized**.

In addition, a **smart tracking of luggage** will be available on smartphones, based on electronic tags and biometrics

**Virtual Incheon Airport** is a **digital replica of Incheon Airport** which **allows passengers to explore and experience various virtual interactive contents** simply using smartphones.

**Incheon Airport's navigation app. for indoor parking** along with innovations in **indoor positioning technology** provides **accurate traffic information and vehicle routes**.

Thus, it provides the **real-time status of parking lots** and **the location information of an empty parking space**. It also provides route information based on optimal path finding and driver's preferences

**AR Wayfinding** utilizes 3D spatial information and AR technology to enhance the passenger experience. Thus, it is possible to benefit real-time tracking of passenger location based on visual data, **allowing personalised guide for passengers**

**Metaverse and robotic technologies** are **at the heart of the digitalization** of the airport, based on 3D spatial information.

**A 3D air traffic control** has been developed

## The future of railway stations ?

# Climatics and Smartbase By ACS

"Multi-user data platform ClimaticsTM is leader in Next Generation Building Intelligence by a **unique approach to Building Installation & Property Management through Digital Twin Technology and Machine Learning Algorithms**.

Our proprietary Smartbase is a powerful gateway to **access building Construction & Operations Data, to digitally visualize building installations, integrating them in an easy to use interface and creating fully automatic controls for optimal energy performance**, **saving a substantial 15 to 40% in energy consumption in both new and existing buildings**, as most effective Sustainable and Circular solution for meeting worldwide energy reduction goals requiring minimal deployment of scarce technical personnel."

## To be considered for

- **real estate departments**
- **railway station managers**

Leading the world to new product applications electrochromic technology utilization.

## Flexible Solid State Electrochromic Thin Film By Ambilight Inc

"Electrochromic (EC) thin films assembled with proprietary EC advanced materials **can modulate light and heat transmission rendering properties such as visual comfort and energy savings**.

The material design and fabrication with solid electrolyte achieve chemically, and electrochemically stable high performance electrochromic devices produced in large scale by cost effective roll-to-roll technique.
 Thin film-based EC devices **can be easily cut and encapsulated into a glass with any curvature and irregular shapes**, which makes it possible to **be applied into a wide "variety of applications"**

## Could be of interest for buildings (stations and offices) and carriages

# First green biomass low carbon solvent PnP water filter gy MBRAN FILTRA CO., LTD.

**The green biomass low carbon solvent PnP water filter** is an industry-leading product and the lowest carbon emission filter in the world that is **unique in its ability to block out bacteria and microplastics reduce carbon emissions by more than 50~70%**

- Green biomass solvent is an excellent solvent that can be made from sustainable materials (plants or biomass), non-toxic,environmentally friendly, sustainable low-carbon solvent;

- The water flow rate of the PES (polyethersulfone) hollow fiber hydrophilic membrane PnP water filter is up to 3 L/min, but only weighs 20g. **Users can get clean, drinkable water anywhere and anytime.**"

# Applicable to water supply in trains, railway stations and maintenance workshops

## HOPE HydroStation   By HOPE Hydration

"The HydroStation is a **cutting-edge bottle refill system** offering users free, filtered water and premium drinks like sparkling water or electrolytes, among others.

The WiFi-enabled HydroStation features technology and sensors providing tracking and **real-time analysis of water quality, usage, pollution levels and more**

HOPE's HydroStation is the answer to the global search for cutting-edge **solutions to eliminate plastic bottle waste**."

## Could be considered for supplying water to clients in railway stations

# Hi-Bot (Hologram Image, Guide Robot) By Hills Robotics & KAIST

"Hibot is an **AI-based self-driving docent/ guide/ disinfection robot** with an advanced hologram feature

The robot can be deployed at various places including convention centers, exhibition centers, hospitals, negative pressure isolation room.

The robot is an advanced intelligent universal guide / docent / disinfection robot that is useful in the contactless era.

It is **equipped with a safe disinfection function which can safely stop the spread of coronavirus** that is globally transmitting

Moreover, Hibot has a hologram and contactless control function for global remote conference call."

# Potential application for cleaning up railway stations

# Wellness Monitoring & disinfection in public facilities By Xandar Kardian

"The recent pandemic was a wake-up call for paying attention to "wellness" factor when it came to public buildings and facilities around the world. Masks provided a certain level of protection, but unfortunately it was widely politicized, leaving many to be exposed to airborne viruses.

Beyond viruses, the world also continued to suffer from increased substance abuse, including Fentanyl in public locations such as bathrooms and elevators

Xandar Kardian has created a **radar technology that can discretely, continuously and autonomously monitor the vital signs of occupants in closed spaces for possible rapid deterioration** and **also help automate disinfection controls**."

## Of interest for toilets in railway stations and in the trains

# AirDeep by AirDeep Co., LTD.

"AirDeep, the **AI Air Quality Sensor with IoT**, **analyzes indoor air quality in real-time and detects air pollution state:** dust, fine-dust, smoke, abnormal air condition, etc.

Furthermore, AI algorithms of AirDeep distinguish smoking types (tobacco or e-cigarette) and **recognize abnormal air condition like fire accident in the vehicles and rooms**."

## To be considered for:

- **Air monitoring in railway stations, trains**
- **Fire alarms**
- and even more **for maintenance works in tunnels**

# Metatwinbot    by  BrainBot

"MetatwinBot is a **robot** that **maximizes communication for users with low accessibility to metaverse environments**

Its **machine vision** and **visual interaction** devices allow users to communicate and engage in a virtual environment without requiring any of the devices used in conventional metaverse environments, such as VR glasses

MetatwinBot was built based on the "digital twin" concept.
It executes commands and connects the metaverse to the real world, **enabling people in digital blind spots such as the elderly and disabled to communicate with family, friends, medical professionals, and social workers, allowing them to receive vital medical and health care wellness services**

# To be closely watched for interaction with disabled passengers

# Autonomous Model A By WHILL, Inc.

"Utilizing **advanced mapping technologies combined with the latest in sensors and collision avoidance**, Autonomous Model A is designed to **significantly change how individuals with limited mobility and reduced sensory or fine motor skills navigate large venues, such as airports, theme parks and hospitals**, creating a new era for safe and reliable transportation in crowded areas."

## Could be applied to people with reduced mobility in railway stations

## Ashirase by Ashirase, Inc.

Ashirase is a **wearable navigation system** that **assists the visually impaired with walking**

The system consists of a **smartphone app and an in-shoe vibration device** including a motion sensor
The app receives data from the sensor and puts it together 1r with map and satellite positioning information to **generate navigational instructions**, which the foot device communicates to the user through vibrations.
Ashirase's **intuitive instructions via vibration can guide users to their destinations more safely without obstructing their hearing** – a sense that is critical to the visually impaired"

## To be studied by Railway Station Managers for visually impaired passengers

# Innovations which could be applied in railways
# Night Trains

# Motion Pillow 2023 by 10minds      Co., Ltd.

"This product consists of a **pillow** and a drive unit called the Motion System.
**When the user snores, the Motion System recognizes this and injects air into the airbag built into the pillow**

**Snoring can be stopped naturally** from the user's head being turned or the cervical spine being lifted due to the inflated airbag or securing the airway by applying a mild level of tension to the muscles around the airway.

This product can prevent snoring even if the user is in a non-supine position. Even if there is another person, it only responds to the user's snoring sound."

## To be considered for Night trains

# Innovations which could be applied in railways
# Maintenance in Workshops
# Warehouses

## Aloception    by Visual  Behavior

"Aloception is a **visual software sensor addressing mobile robots' ful autonomy**.

Aloception is providing the core components of the scene: navigable area, obstacles & robot localization.

Free space & obstacles are provided with descriptors to address final robotics applications.

The solution is solely based on cameras & intelligence with the flexibility to run one or multiple cameras and lenses at the same time from various positions."

## To be considered for cobots

## ADTF3175 by Analog Devices, Inc.

"The ADTF3175 module is the **industry's first high-resolution, industrial quality, indirect Time-of-Flight (iToF) module for 3D depth sensing and vision systems**, fully calibrated for depth data and ready to image a scene.

**It enables cameras and sensors to perceive 3D space in one-megapixel (MP) resolution**.

The module offers highly accurate +/-3mm iToF technology **available for machine vision applications ranging from industrial automation to logistics**, healthcare, and **augmented reality**. It provides **an image resolution** that **is double or triple the pixel count of competitive solutions**

## Useful for:

- **Logistics in warehouses**

- **Augmented reality**

# Innovations which could be applied in railways
## Occupational Health

# Cray X by German Bionic Systems GmbH

"The Cray X is a fully-connected, powered **exoskeleton for use in industrial environments such as in the fields of logistics, production and construction**.
It **protects the lower back area by giving up to 66 lb (30 kg) of support per lifting movement** as well as **providing active walking assistance to prevent fatigue**

The human-machine system thereby combines human intelligence with machine power."

## To be considered for:
- **Staff in warehouses**
- **Track maintenance workers**

# Smart Wearable Airbag for Professionals C3 By Safeware Inc.

"**Designed to protect those working at heights**, the **wearable airbag** automatically inflates within 0.2 seconds in case of an accident, **absorbing the fall impact** and **protecting all crucial body parts** such as the head, neck, spine and chest area

Additionally, the **airbag** is connected through BLE **to an accompanied smart phone application**, through which an **automatic alert** is sent and an **emergency call is dialed to pre-recorded emergency contacts**

This ensures that **not only the body is protected** during the fall, but that **first aid and a timely rescue is guaranteed**"
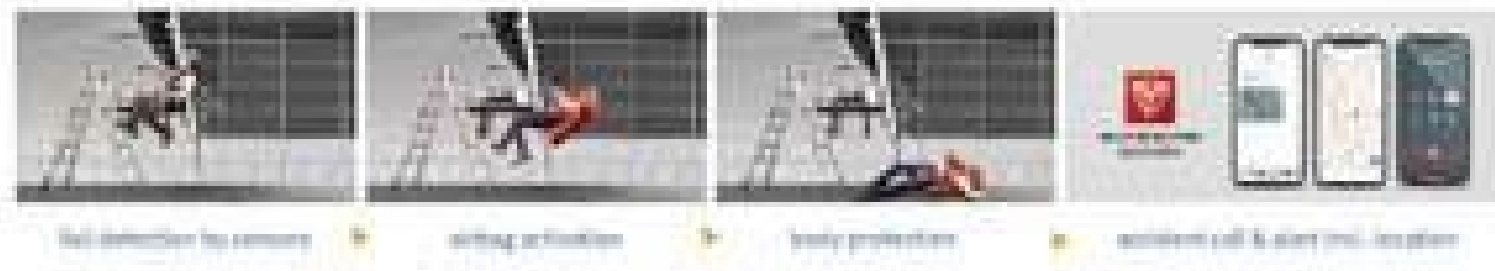
## Of interest to catenary workers

# Skinetic   by Actronika

"Skinetic is a **haptic vest** that allows the user to feel different life- like sensations according to the interactions within the virtual environment.

The Skinetic vest is equipped with 20 highly innovative voice-coil motors all over the torso, this technology allows us to dissociate the intensity from the amplitude of the vibration, thus allowing us to **reproduce an infinite range of sensations**

The vest also **provides localized sensations** and can actively track the user position in real time to provide realistic haptic feedback."

**Not easily transferable but to be considered**

# Innovations which could be applied in railways
## Telecom
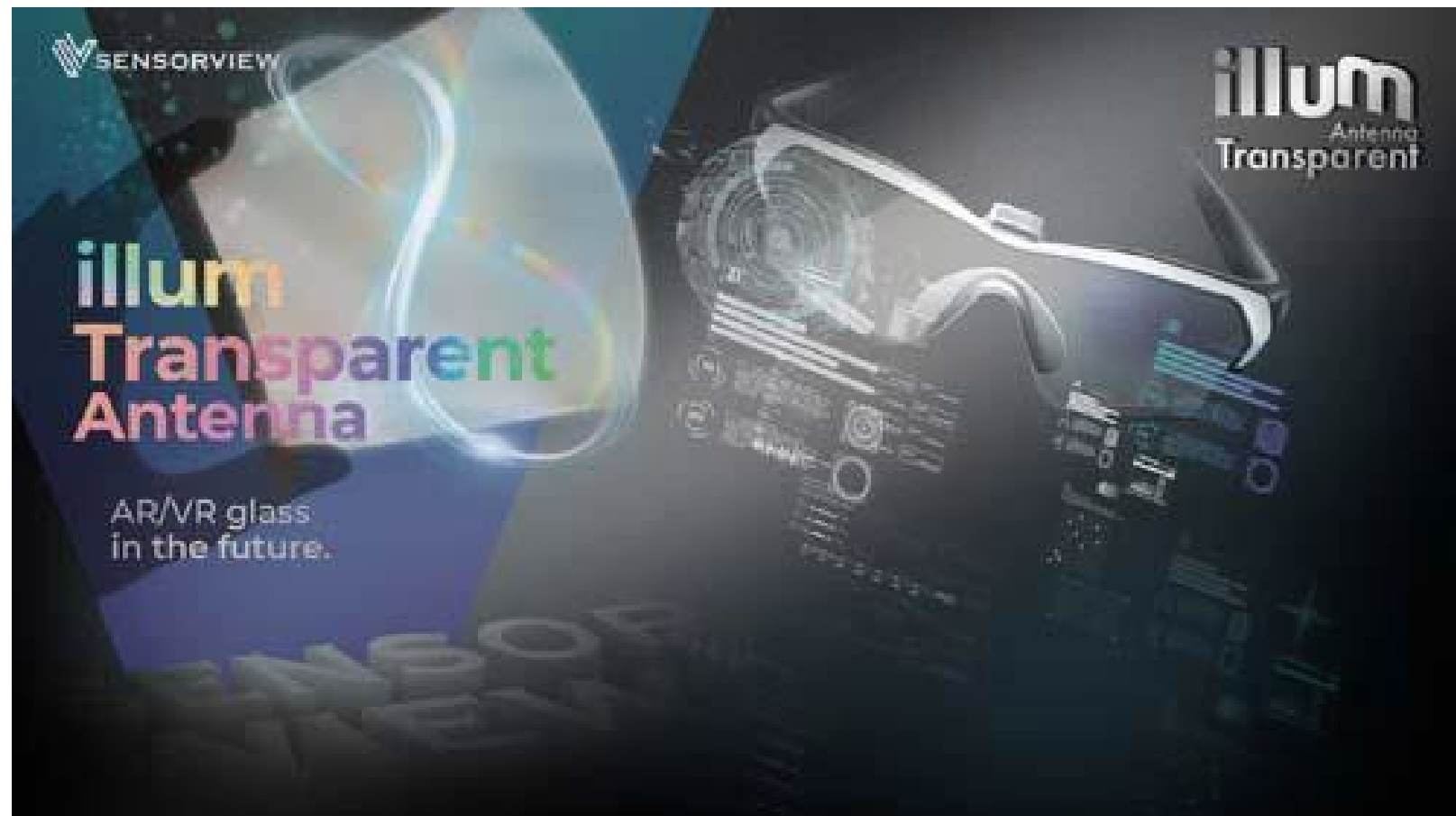
## Illum transparent antenna for metaverse applications By Sensorview (Yonsei University)

Existing antennas utilize glasses' frames or separate spaces to implement electronic components and antennas. As a result, it has a low antenna efficiency and difficult to secure coverage

**By implementing the antenna in the glass part of the glasses where information is displayed, it is possible to increase the radiation efficiency of the antenna and secure the coverage**

Additionally, we have secured both manufacturing technology and antenna implementation technology, that can implement both sub6 and WIFI antennas onto the front glass of devices, including AR/VR devices

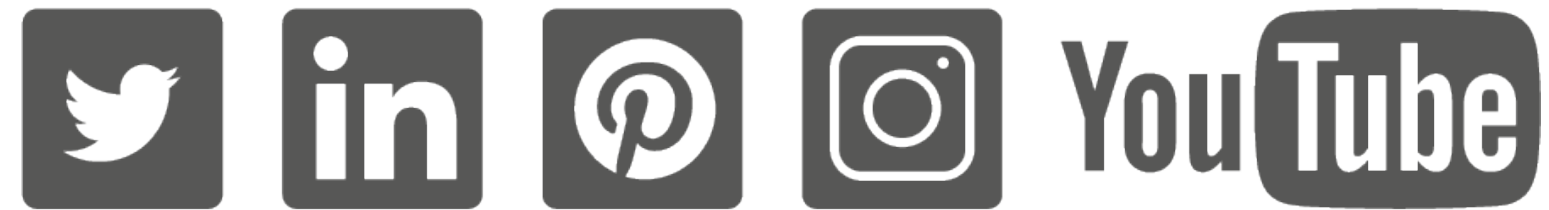## Could be of interest for stations

# FOR FURTHER INFORMATION
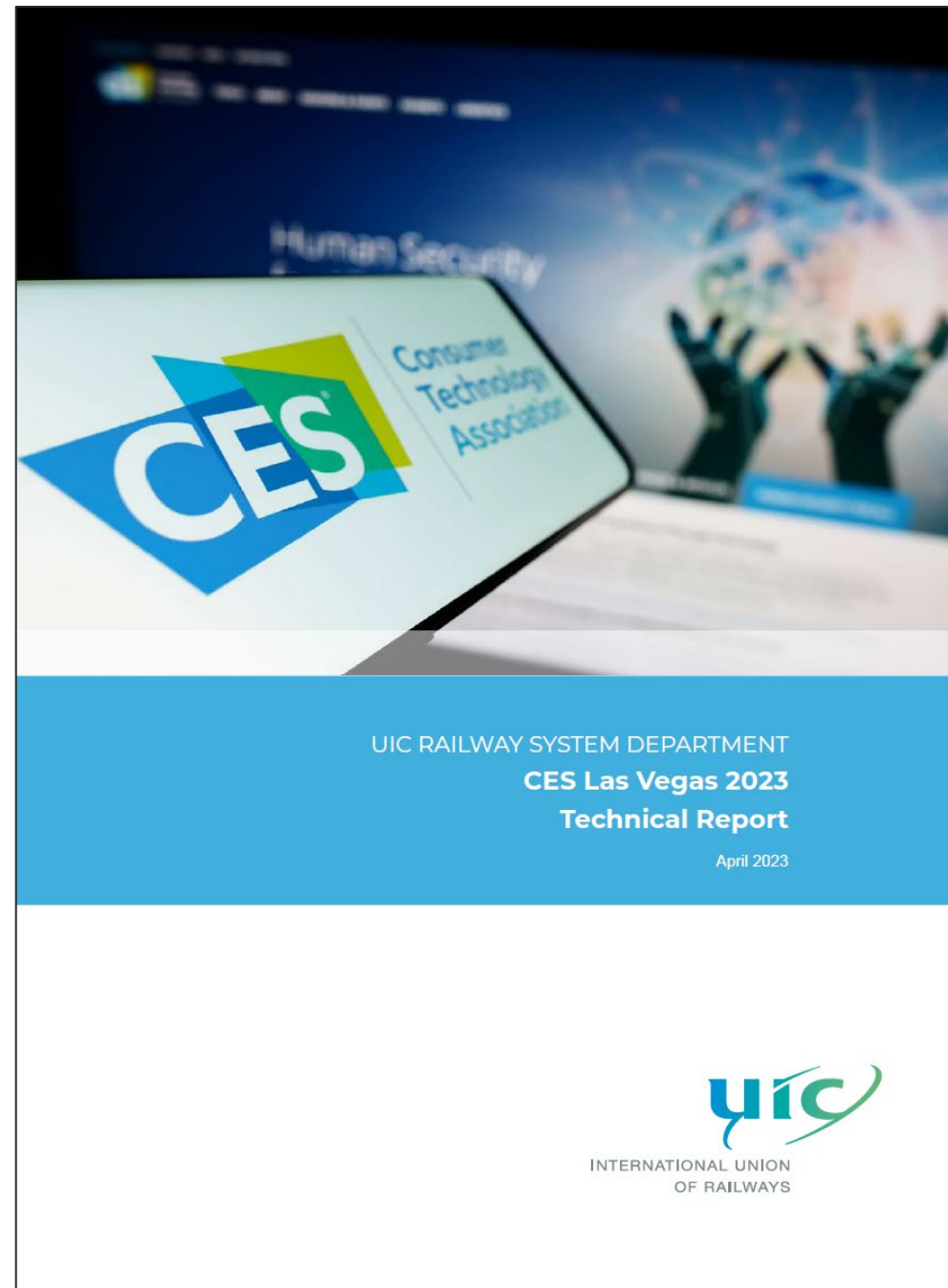


https://uic.org/IMG/pdf/ces_las_vegas_2023_uic_technical_report_en.pdf

**Thank you for your kind attention.**

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# www.uic.org



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