StartUs insights

Railway

Trend Report

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Innovation Intelligence at Your Fingertips

At **StartUs Insights**, we make the world's information on innovation, emerging companies, and technologies accessible. Our **Big Data & AI-powered Discovery Platform** covers over **2,5 million startups & scaleups globally**, making it the world's leading resource for data on emerging companies.

This technology enables you to identify what's next by quickly and exhaustively scouting startups, scaleups, emerging technologies & trends that matter.

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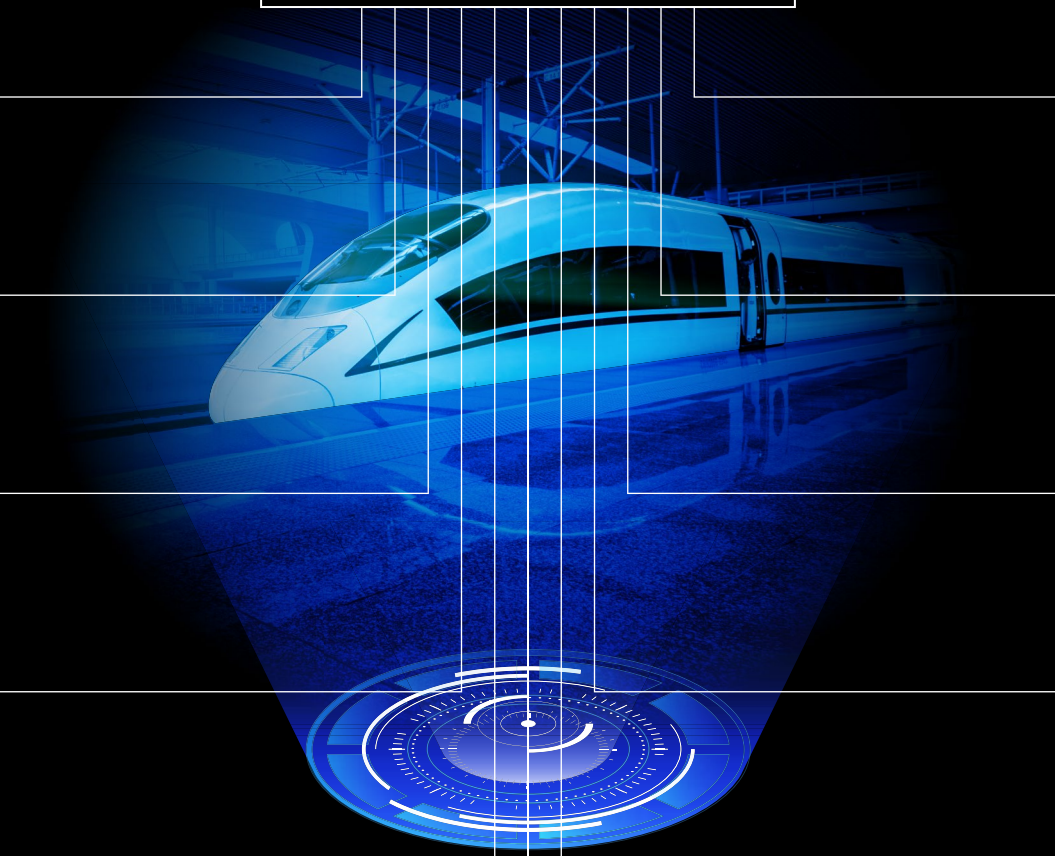
Rail transportation is undergoing significant changes in response to the growing demand for fast transportation between and inside cities and countries. The major rail industry trends involve drones and smart sensors for inspecting railway tracks, digital communication platforms, and automatic train control (ATC). Notoriously slow to implement modern technologies, rail tech startups are working to scale various solutions that look to combine biometric information, artificial intelligence (AI), and cloud computing. For train operators and railroad companies, the Internet of Things (IoT) devices enable the implementation of predictive maintenance to monitor for any anomalies. In addition to condition-based monitoring, newer rail industry trends such as rolling stock hybridization and high-speed rail also contribute to the growing pool of future-looking railway technologies.

Covering over 2,5 million startups & scaleups globally, we use our Big Data and AI-powered Discovery Platform to identify innovative applications, technologies, and companies impacting the Railway. This exhaustive, data-driven startup scouting pinpoints emerging trends and technologies in the Renewable Railway. For this research, we analyzed a sample of 1633 startups and scaleups and present the Top 10 Trends along with 20 highly relevant solutions.

In the Innovation Map below, you get an overview of the Top 10 Railway Trends & Innovations that impact companies worldwide.

Innovation Map: Railway

1633
Startups & Scaleups



- Autonomous Trains
- Internet of Trains
- Artificial Intelligence
- Decarbonization
- Rail Connectivity
- Passenger Experience
- High-Speed Rail
- Rail Automation
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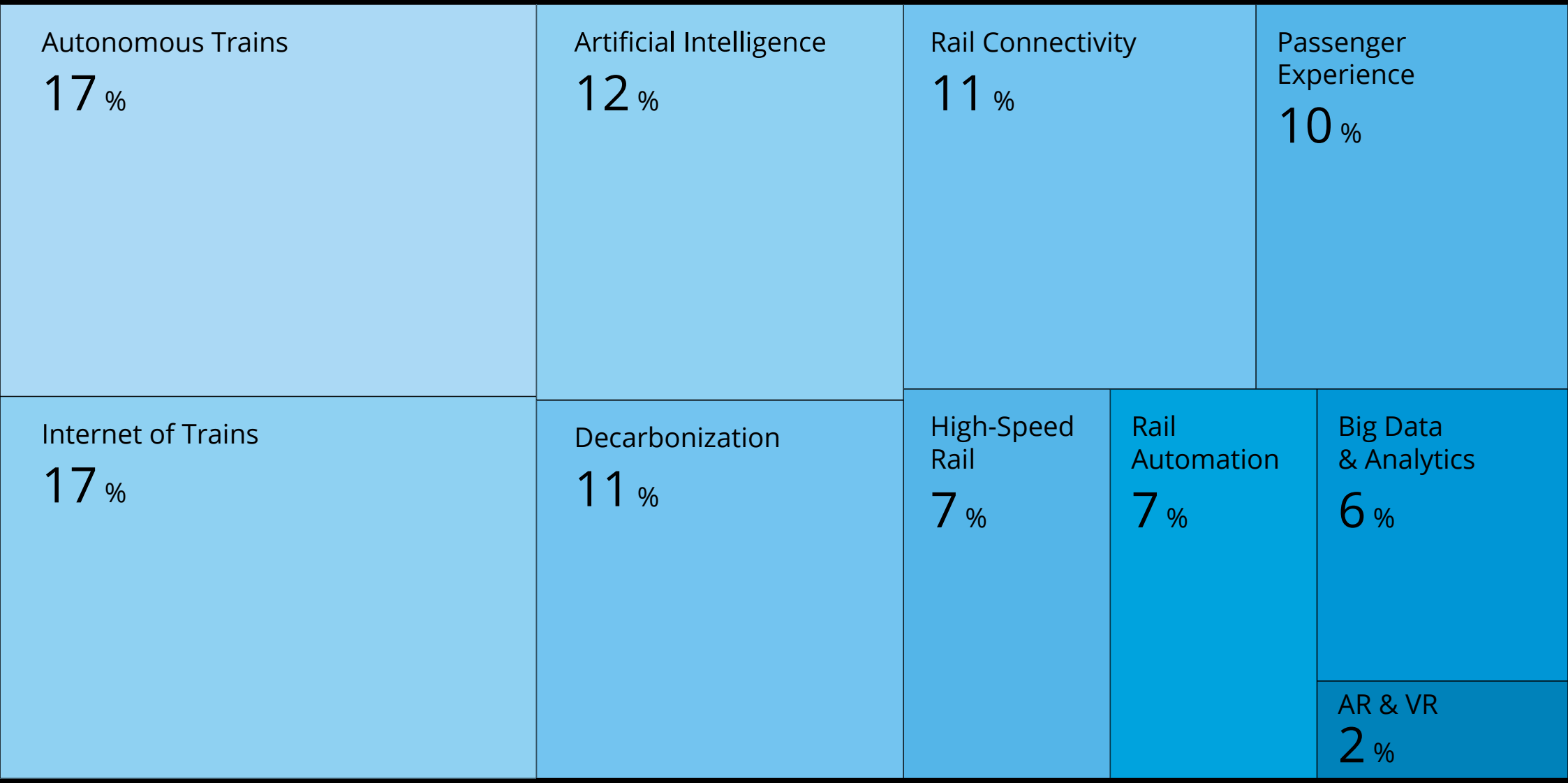
Tree Map: The Impact Of Railway Industry Trends

Based on the Rail Innovation Map, the Tree Map below illustrates the impact of the Top 10 Rail Industry Trends. Startups and scaleups are working on developing new autonomous train systems that will increase the efficiency and reliability of railway transportation.

These systems rely heavily on the development of the Internet of Things (IoT), artificial intelligence (AI), and connectivity technologies. Additionally, the zero-emissions initiatives drive the rail industry towards the implementation of decarbonization strategies.

Top 10 Rail Industry Trends & Innovations



StartUs insights | This tree map illustrates the top 10 innovation trends & their impact on the Rail Industry

Global Startup Heat Map: Railway Startups & Emerging Companies

The Global Startup Heat Map below highlights the global distribution of the 1.633 exemplary startups & scaleups that we analyzed for this research. Created through the StartUs Insights Discovery Platform, the Heat Map reveals that Central Europe is home to most of these companies while we also observe increased activity in India as well the US.

Below, you get to meet 20 out of these 1.633 promising startups & scaleups as well as the solutions they develop. These 20 startups were hand-picked based on criteria such as founding year, location, funding raised, and more. Depending on your specific needs, your top picks might look entirely different.

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1633
STARTUPS ANALYZED

Global Startup Heat Map: Railways

This Global Startup Heat Map illustrates the geographical distribution of 1633 startups & emerging companies we analyzed for this topic

Autonomous Trains

Enabled by advanced sensor technology and real-time data transmission, the autonomous train is an effective solution for improving punctuality, reliability, and capacity optimization in the railway industry. Upgrades to signaling technology and automatic train control (ATC) systems reduce technical errors, improve traffic information flows, and reinforce passenger confidence in rail transit. For example, a grade-of-automation 4 (GoA4) system autonomously handles emergency situations and obstacle detection, as well as controls the train's speed, brakes, and doors.

Belgian startup OTIV develops advanced driver-assistance system (ADAS) and full self-driving (FSD) solutions for light rail and shunting operations. The startup uses artificial intelligence (AI), deep learning, computer vision, and sensors to develop the zero-emission OTIV Light Rail Vehicle System, adapting locomotives to urban environments. Equipped with object detection and collision avoidance technologies, ADAS and FSD systems further increase the safety and efficacy of rail transport.

South African startup GEAR International Holdings provides integrated railway signaling solutions. The system uses train location information for interlocking and enables communications-based train control (CBTC). Additionally, the movement and interlocking of trains are integrated with wayside signaling control systems. The startup's signaling solutions ensure safety, optimize train movement, and maximize the use of platform availability.

Internet of Trains

IoT greatly impacts the reliability and safety of railway infrastructure. Condition-based monitoring prevents delays resulting from track and train part failures, which optimizes maintenance efficiency and costs, as well as improves passenger satisfaction. Additionally, IoT-enabled advanced analytics allows railway operators to find data-driven solutions to improve fleet control and rail operations efficiency.

Canadian startup TRAINFO offers a cost-effective solution that helps reduce traffic delays at railroad crossings. The startup uses train sensors, Bluetooth, and prediction software to determine when to open and close rail crossings. This information is then conveyed to drivers through information systems, such as roadside signage, mobile apps, or traffic signaling. The startup's solution also aids city planning officials when designing and operating railway crossings and other infrastructure.

The US-based startup HUM Industrial Technology offers predictive monitoring solutions to railroad shippers and railcar owners. The startup uses wireless IoT sensors for automated safety monitoring and prediction of wheel and bearing failure, as well as detection of oil or gas leakages. Additionally, the startup provides a live global positioning system (GPS) tracking solution offering a comprehensive overview of fleet location and history. The startup helps rail operators reduce maintenance costs by enabling early detection of potential failures.

Artificial Intelligence

AI finds numerous applications within the railway industry, encompassing asset management, predictive maintenance, and emergency notification. Deep learning algorithms and neural networks help optimize train scheduling and minimize delays. Moreover, advanced passenger information systems improve transportation services and increase passenger satisfaction.

Swedish startup The Train Brain develops AI models that improve the reliability of public transportation. The startup's tool delivers delay forecasting, as well as real-time traffic simulations and reporting. The tool processes train schedules and signaling or global positioning system (GPS) data to conduct rail network forecasting. The Train Brain enables rail operators to make data-driven traffic planning decisions and passengers to be more informed when planning their commute or travel.

US-based startup Cedar AI offers artificial intelligence solutions to help rail operators improve yard efficiency. The startup's AI-powered platform integrates with existing software to ensure safety rule compliance during rail yard operations. The platform helps rail operators optimize yard processes and reduce workload while also improving the safety of train handling.

Decarbonization

Although railways are the most sustainable form of transportation, following ambitious net-zero emissions plans, governments are looking to further decarbonize the rail industry. The most common decarbonization solutions include replacing diesel trains with battery technology, hydrogen fuel cells, or electric trains. To further minimize the CO2 emissions, rail operators deploy electric locomotives that use energy from renewable sources, such as solar or wind.

Australian startup Core Environmental Systems offers energy storage solutions to communities and end-users across industries, including railways. The startup's Enviro Cell – Rail, designed specifically for the demands of the rail industry, solves the crank power shortages of traditional batteries. In the process, the startup reduces, and sometimes eliminates, monetary losses for rail operators and simultaneously increases the efficiency of rail transportation.

The US-based startup Hoeller Electrolyzer provides polymer electrolyte membrane (PEM) electrolysis stacks for the manufacturers of green hydrogen systems. The startup offers its Prometheus Electrolysis-Stacks to optimize hydrogen fuel cell storage capabilities in electric and hybrid locomotives. This optimization increases the maximal output of PEM electrolysis and also lowers the costs of storing green hydrogen.

Rail Connectivity

Modern railway mobile communications systems, enhanced with 5G technologies, allow for low-latency communications and high performance, as well as the reliability of railway infrastructure. Further, communications-based train control (CBTC) enables efficient rail traffic management and asset monitoring. Train connectivity applications span train positioning, control, maintenance, passenger experiences, and passenger data collection.

British startup Tethir develops optoelectronic ground-to-vehicle devices for train and autonomous vehicle connectivity. The startup's devices provide high bandwidth capabilities at low power demand. The devices, powered by solar batteries, create a wide field of views for better connectivity.

Czech startup Passengera develops a platform that provides Wi-FI connection and infotainment for railway passengers. The startup's connectivity solution gives passengers access to onboard entertainment, news, as well as travel and accommodation information via smart devices or laptops. Additionally, the startup's connected solutions support the train's passenger information and ticketing systems, route information, and CCTV cameras.

Passenger Experience

To improve passenger experience, rail companies employ automatic ticketing and video surveillance, set up train delivery services, and create train hotel experiences. Video surveillance detects theft and helps optimize passenger load. Further, smartphone and mobile apps automate ticketing and price comparisons for passengers and rail companies. Onboarding systems further improve last-minute booking, identification control, as well as seat assignments, and infotainment systems engage passengers during travel. To further simplify the ticketing process, as well as passenger identification, companies employ biometric ticketing solutions.

Israeli startup GoWith develops a seat allocation platform for railway companies. The startup's software-as-a-service (SaaS) RideWith solution allows companies to create specific zones in a train. In particular, the zones may include silent and family-oriented environments, casual or business areas, improving passengers' riding experience.

Indian startup RailRestro offers food delivery services to train passengers. The startup's online service allows contactless delivery to the passenger's train seat from a range of accredited restaurants. The startup gives passengers an opportunity to transform a train ride into a culinary experience.

High-Speed Rail

The development of high-speed rail systems is aimed at making the transportation of people and goods more efficient and frequent. HSR encompasses high-speed train and line design and construction. In particular, companies focus on both the adaptation of the existing infrastructure and the development of new high-speed systems such as hyperloop, which are capable of exceeding the speed of 1000 km per hour.

Spanish startup Zeleros designs electric-powered autonomous hyperloop vehicles and infrastructure. The vehicle, driven by an electric powertrain, uses active magnetic levitation technology. Additionally, the startup develops an electric aerodynamic propulsion system for the vehicle to reduce the need for placing linear motors along the track and an electromagnetic launcher for vehicle range optimization.

Polish startup NEVOMO develops a magnetic rail system capable of reaching up to 550 km per hour. The train uses passive magnetic levitation and linear motor technology to further improve the transportation of people and goods. The startup's technology allows the new-concept trains to operate on existing tracks alongside the conventional trains. Additionally, NEVOMO develops plans for enabling hyper-rail and hyperloop technologies.

Rail Automation

The automation of the railway industry goes beyond autonomous train operations (ATO). Startups and scaleups develop robotic systems for infrastructure cleaning and maintenance and drone technology for remote inspection. Additionally, traction control automation prevents delays and improves the safety of rail infrastructure. Automation of the rail industry helps railway companies optimize asset efficiency, monitoring, and maintenance, delivering improved experience and rail reliability for passengers.

Australian startup TerraDrone provides a wide range of services for industrial sectors, including railways. The startup's services include topographic and volumetric surveys, 3D computer-aided design (CAD) models and 3D mesh models, as well as virtual reality and at-height inspections. The startup has conducted railway bridge inspections using drones to improve the safety and maintenance of critical public infrastructure.

Dutch scaleup Laser Precision Solutions develops laser technology solutions for track maintenance. The scaleup's product, LaserTrain, addresses the low railhead adhesion issue that causes train delays due to autumn leaf deposits on the track. TriboMeter is another solution to measure real-time friction between the track and the train enabling the optimization of acceleration and energy consumption. By improving traction, the solutions reduce train delays and cancellations, as well as improve overall rail safety.

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Big Data & Analytics

The use of big data in the railway sector paves the way for train communication, predictive analytics, asset management, passenger information systems, and data management platforms. By deploying smart railway sensors, millions of data points are gathered and analyzed to further improve the safety, security, and reliability of rail infrastructure. The ability to predict failures further allows rail operators to plan repairs, increasing the availability of rail. Startups and scale-ups are developing IoT sensors to collect data for almost every facet of rail infrastructure, including railcars, tracks, and signaling units.

British startup Raildiary provides a data tracking platform for railway construction companies. The startup develops the Sitediary app, a platform for railway project management and analysis. The startup's solution finds applications in rail, including maintenance, signaling, and electrification, as well as fatigue and emergency management. The solutions optimize the efficacy of rail construction projects to minimize delays, resource waste, and unnecessary costs.

French startup Everysens provides Traffic Management System (TMS) solutions to railway shipping and freight forwarding companies. The startup's proprietary platform, TMS Rail, combines AI and IoT to provide a real-time TMS solution for rail operators. The platform allows operators to make processes more efficient to eventually optimize end-to-end rail operations.

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Augmented & Virtual Reality

The applications of mixed reality in the rail industry span personnel training, design visualization, and customer engagement. Interactive train windows provide infotainment and route information while augmented reality (AR) mobile apps allow passengers to take part in rail infrastructure design. Additionally, virtual reality (VR) headsets make training more immersive and informative. AR and VR solutions allow railway companies to reduce personnel training costs and improve passenger satisfaction and loyalty, increasing their sales.

Ukrainian startup TSUKAT develops AR/VR applications and interactive solutions across various industries. In particular, the startup provides customer engagement services for train stations. The startup's mobile apps allow passengers to interact with the railway station infrastructure, as well as receive station navigation instructions, using their mobile devices.

Dutch startup VRTECH offers VR design, demonstration, and training systems for personnel development and marketing. The startup develops a number of rail simulations to improve the skills of train inspectors and engineers. The startup also provides a railway station design simulation showcasing future services and allowing passengers to experience various features of the station infrastructure.

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Discover all Rail Technologies & Startups

The Rail Industry Trends & Startups outlined in this report only scratch the surface of trends that we identified during our in-depth research. Among others, IoT-based communication technologies, AI, and high-speed rail advancements will transform the sector as we know it today.

Identifying new opportunities and emerging technologies to implement into your business early on goes a long way in gaining a competitive advantage. Get in touch to easily and exhaustively scout relevant technologies & startups that matter to you.

WHAT OUR PARTNERS SAY

We appreciate working with StartUs Insights because of their team's flexibility and commitment to serve our needs.

CAF
Head of Technology Strategy Area
R&D Department
Xabier Perez

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Identify What's Next

The [StartUs Insights Discovery Platform](#) covers over **2,5 million startups & scaleups globally** – making it the world's largest resource for data on emerging companies. The SaaS Platform enables you to **easily**, **quickly**, **and exhaustively scout relevant companies**, **technologies**, **& trends** for your innovation activities. This saves your time and increases efficiency, which is why more than 650 leading corporate partners including Samsung, Kyocera, and Nestlé already trust our technology.

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