

Former SpaceX Engineers Raise \$49.55 Million to Build Autonomous Battery-Electric Rail Vehicles

Parallel Systems reveals it is decarbonizing freight by building a cleaner, automated rail future

January 19, 2022 (Los Angeles, CA): [Parallel Systems](#), a company founded by former SpaceX engineers to reimagine the railroad system, has raised \$49.55 million in Series A funds to build autonomous battery-electric rail vehicles that move freight. The round is led by [Anthos Capital](#), and includes investments from [Congruent Ventures](#), [Riot Ventures](#), [Embark Ventures](#), and others. The funds will be used to build a fleet of rail vehicles, execute advanced testing programs and grow the team. The company, which came out of stealth mode today, has raised \$53.15 million to date, including \$3.6 million in seed funds.

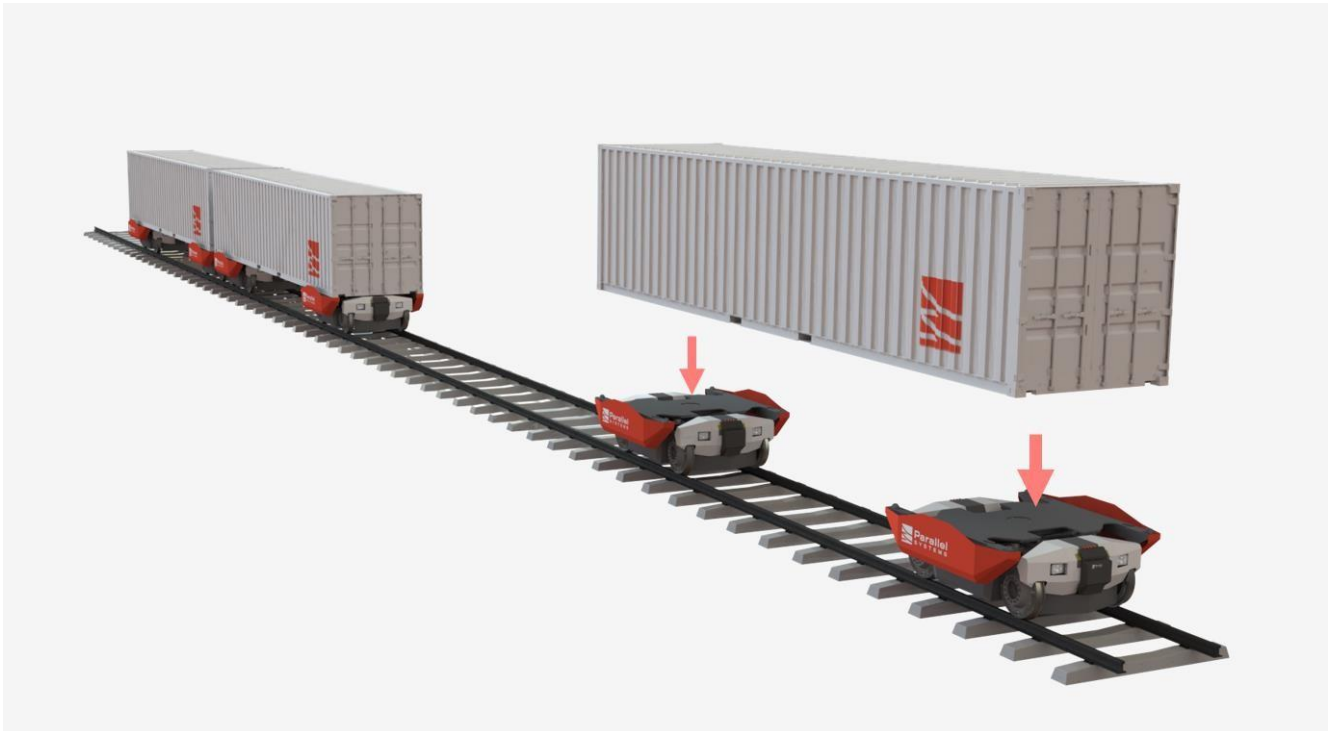
“We founded Parallel to allow railroads to open new markets, increase infrastructure utilization, and improve service to accelerate freight decarbonization,” said Matt Soule, Co-founder and CEO, Parallel Systems. “Our business model is to give railroads the tools to convert some of the \$700 billion U.S. trucking industry to rail. The Parallel system can also help alleviate the supply chain crisis by enabling low cost and regular movement of freight in and out of ports. Parallel’s competitive edge is our autonomous battery-electric rail vehicles, which are designed to move freight cleaner, faster, safer and more cost effectively than traditional trains or trucks.”

Parallel Rail Vehicles: Creating a More Efficient and Flexible Rail System

Parallel’s patent-pending vehicle architecture combines innovative software and hardware with the historic rail industry to increase the utilization of today’s railroads. The company’s autonomous battery-electric rail vehicles load and transport standard shipping containers as a single or double stacked load. The railcars, which are individually powered, can join together to form “platoons” or split off to multiple destinations while en route. The railroad’s closed network is ideal for the safe and early commercialization of autonomous technology due to limited track access and centralized traffic control.

The rail vehicles are more flexible than traditional trains. Unlike traditional freight trains, Parallel’s platoons do not need to accumulate large quantities of freight to make service economical, which enables more responsive service and a wider range of routes. This dramatically reduces the waiting times associated with loading trains that are miles long. The system can support service at a range of distances, from across a city to across the country. Parallel’s unique architecture will also bypass congested switching yards, which are historically

used to manually sort and reassemble freight onto secondary trains—saving hours, or even days, of transit time. The near continuous flow of containers through terminals results in greater asset utilization, faster delivery times, and higher quality of service.



Parallel Platoon Architecture

Parallel Rail Vehicle Preliminary Specifications

Propulsion	Battery-electric Permanent Magnet Synchronous Motor (PMSM)
Autonomous System	Fully autonomous with bi-directional camera-based perception system
Payload Capacity	Up to 128,000 lbs. / 58,000 kg.(double stack container), 2.8x more than a semi-truck
Range	Up to 500 mi. / 800 km. range between charges; uses 25% of the energy of a semi-truck
Charging Time	Less than 1 hour

Introducing New Environmental & Safety Benefits to the Rail Industry

Parallel is building a cleaner and safer rail system using automated zero-emissions technology. The company's freight transportation solution is even more energy efficient than freight trains

because it is lighter and more aerodynamic. The patent-pending platoon technology features self-propelled rail cars that push against each other to distribute the aerodynamic load. Parallel vehicles use just 25% of the energy compared to a semi-truck and offer the lowest operational

cost of any surface freight transportation mode. Less energy means smaller batteries, less strain on the grid, and lower charging infrastructure costs.

Parallel's zero-emission vehicles will dramatically reduce the freight industry's carbon emissions. Trucking accounts for 444 million metric tons of carbon dioxide, or approximately 7%, of all CO2 equivalent greenhouse gas (GHG) emissions in the United States, according to the 2019 U.S. [Environmental Protection Agency](#) figures. Parallel aims to significantly reduce GHG emissions by converting trucking freight to electric rail.

New levels of railway safety are possible due to the vehicle's ability to rapidly detect hazards, such as a vehicle on the track. The railcars, which leverage a camera-based perception system and redundant braking, can stop safely and autonomously up to 10 times quicker than a train. This means the vehicles can perform an emergency stop within the line of sight that the sensors perceive an object. In addition, the platoons automatically maintain safe speeds based on the track conditions.

Parallel platoons will reduce waiting times at railroad crossings. The platoons are shorter than traditional trains, and the vehicles will separate if blocking traffic, allowing emergency vehicles and the public to safely proceed without delays.



Parallel's Second Generation Prototype Vehicle

Invigorating the American Rail Industry

The United States has the world's most expansive railroad system with over 140,000 miles of track; however, Parallel estimates that less than 3% of that network is occupied by active trains at any given moment. To make freight deliveries economical, today's railroads typically focus on moving shipping containers distances more than 500 miles. Parallel has identified an opportunity to bring more business to rail by improving the unit economics over shorter distances.

Introducing a more flexible system will alleviate pressure on highway infrastructure and the trucking industry as it faces overwhelming demand and a [driver shortage of 80,000](#) U.S. drivers.

Parallel's unique system eliminates the constraints of traditional train architecture to compete more directly with the flexibility benefits of trucking. Today, trucks are responsible for moving most of the nation's freight by miles. Moving a portion of that freight volume to autonomous battery-electric rail will help alleviate highway congestion, improve road safety, reduce road wear and tear, provide shippers with more cost-effective transportation, and provide environmental health and safety benefits by reducing GHG trucking emissions.

Parallel's proprietary architecture allows for smaller, cleaner, and less expensive terminals that can be built closer to shippers and customers, effectively opening up new markets and reducing last-mile delivery costs. Today, traditional rail terminals have to be large enough to service long trains, and are each built on hundreds of acres of land. These large terminals are expensive, remote, and result in slower delivery times. In addition to reducing the cost of traditional terminals, Parallel enables:

- Micro terminals: Low capital expenditure, zero-emissions terminals built closer to shippers and customers that require less than 5% of the land compared to a traditional terminal
- Direct to seaport: Enables loading and unloading containers directly from port crane onto rail; addresses supply chain issues by reducing congestion in seaports by eliminating the need for storage within the port complex; reduces yard truck usage; creates shuttle system to inland ports and terminals
- Direct to warehouse: Connects rail to adjacent factories and warehouses, brings containers directly to the facility, eliminating transportation mode changes and short distance truck delivery costs; increases weight capacity as rail can sustain more tonnage than trucks

Parallel is developing software that allows its vehicles and platoons to safely integrate with existing rail operations so all freight trains and transit interoperate. The fully-automated connected system leverages machine learning to optimize vehicle routing, traffic scheduling and energy consumption. The result will provide customers with hassle-free, best-in-class service and freight tracking.

Expertise in Using Advanced Technologies to Disrupt Established Industries

Parallel was founded in January 2020 and is led by three former SpaceX engineers:

- [Matt Soule](#), Co-founder & CEO of Parallel Systems; previously Head of Avionics at

SpaceX where he led a department of 300 people in the design and testing of space electronics (13 years)

- [John Howard](#), Co-founder & Vice President of Hardware, Parallel Systems; previously Head of Batteries at SpaceX where he introduced lithium-ion to human spaceflight (8 years)
- [Ben Stabler](#), Co-founder & Vice President of Software, Parallel Systems; previously Head of Avionics Software and lead engineer for motorized actuator electronics at SpaceX (5 years)

Parallel has a team of approximately 25 engineers that hail from Google, Tesla, Uber, SpaceX, and more. The company is headquartered in Culver City, California, with an office in Palo Alto, California. Parallel is currently testing its autonomous battery-electric rail vehicles on a closed track in the Los Angeles area.

About Parallel Systems

Founded in 2020, Parallel Systems is the world's first autonomous battery-electric rail system. The company is a U.S. based manufacturer and transportation technology innovator whose mission is to deliver a safer, more efficient and sustainable alternative to short-haul trucking. The company provides significant benefits, including: 1) enables railroads to grow by increasing their role in shorter-route transportation; 2) makes America's busiest roadways safer for motorists by decongesting; 3) reduces the costs of shipping; 4) creates high-skilled, high-wage jobs; 5) reduces pollution. To date the company has raised nearly \$100 million in venture capital funding as well as an ARPA-e grant.

For more information please visit: www.moveparallel.com

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