EBERLEIN INNOVATIONS

1. Our mission

To provide innovations superior to the best state of art and empower those prepared to lead their industry.

2. Our values

We value a free society, individual human rights, creativity, and scientific inquiry. We strive for beneficial and sustainable technologies and products.

3. Objectives in the US market

To license IP and facilitate production in USA.
To conduct R&D and develop new product specifications.
To partner with investors for scaling up, for participation in public transport projects, and for intensifying R&D in the field of applied artificial intelligence.

4. Fields of innovation

4.1 for use in retail & logistics

• space-saving trolleys, holding the world record for shortest nesting increments since 2012 (R&D completed, in production since 2014)
- supermarket trolleys, transport trolleys, picking trolleys for online retail, airport trolleys, etc

• trolley fleet management IT solution (in progress)

• smart trolleys, smart gates featuring checkout function (in early stage)

• automated stores (next step by planned US company)

4.2 for public transport systems

• advanced electrification technology, slashing costs for high-speed rail and making Diesel locomotives redundant (ready for implementation)

• enabling high-speed rail in urban transport networks, slashing transit times as well as diameters and costs of tunnels (ready for implementation)

5. Organisation

6. IP portfolio in North & South America

International patent application no.	**USA**	**Canada**	**Mexico**	**Brazil**	**Chile**	**Colombia**	**Inventor / Contact**
Trolleys							**Martin Eberlein**
WO2011/127880 A1	Granted	Granted	Granted	Granted	Granted	Granted	
WO2012/034556 A1	Granted	Granted	Granted	Granted	Not filed	Not filed	
WO2012/119592 A1	Granted	Not filed	Granted	Granted	Granted	Not filed	
WO2014/183737 A1	Granted	Not filed	Not filed	Not filed	Not filed	Not filed	
WO2017/152893 A1	Granted	Granted	Not filed	Not filed	Not filed	Not filed	
WO2019/042489 A1	Pending	Pending	Not filed	Not filed	Not filed	Not filed	
Smart trolleys							**Martin Eberlein**
WO2019/154449 A1	Pending	Pending	Not filed	Not filed	Not filed	Not filed	
WO2019/166038 A1	Pending	Pending	Not filed	Pending	Pending	Not filed	
Smart gates							**Martin Eberlein**
Filed, not yet published	To be filed						
Public transport systems							**Surim Eberlein**
Filed, not yet published	To be filed						
	Reference: Granted German patent DE 10 2020 000 076 B3						

7. Global IP portfolio

Patents & patent filings corresponding to above-mentioned international patent applications are in place in Europe, UK. Russia, Ukraine, in several Central Asian countries, Japan, Korea, China, Australia, New Zealand, Singapore, Malaysia, and Thailand.

8. Opportunities for US partners

8.1 Trolleys

A first opportunity is distributorship and/or licensed production & sales of trolleys.

US environmental and labour standards are commonly perceived as competitive disadvantage of a US production particularly against imports from China. We disagree with this assessment and provide a solution.
Compliance with US standards works out well if sufficient production volume supports a high degree of automation and the use of advanced equipment. Achievement of volume depends on the area a production can serve and this in turn depends on distribution cost.
Serving all of North America from a single point of manufacturing is feasible using our patented extremely space-saving specifications.

The proposed strategy is well-proven:
In 2014 a License Agreement was signed relating to corresponding Russian patents with Russia's largest manufacturer of shelving, Kifato MK. In the same year a highly automated trolley production was set up from scratch achieving environmental standards which would comply with a German water protection area. All equipment and material comes from Europe, Japan, or is local. None comes from China.
In 2015, the first full year of production, the Russian and Central Asian market was almost entirely served by Russian competitors importing from China. 5 years later, Chinese producers are largely driven out of that market and the licensed product instead dominates. Hundreds of jobs have been created in the new factory, in particular many high-qualified jobs. The product has been sold to Wal-Mart (UK), all major Russian retailers, Auchan, Metro Group, Kingfisher Group, OBI, B&M, and many others.
The fast growing single-point production near Moscow now serves an area comprising Russia, Central Asia, Europe, and UK.

8.2 A system comprising smart trolleys and smart gates

A second, potentially global opportunity is the joint development and licensed production of a system comprising smart trolleys and gates with item identification and checkout functionality.

The fact that retailers commonly ask for trolleys nesting with their old fleets has been a strong impediment to innovation for decades. While historically most of the early trolley innovations were made in the US, products haven't changed much since the 1960s and patents are mostly expired.
As a solution, we do not propose a transition from current trolleys to more modern trolleys but a leap from trolleys to a smart trolley & gate system. There is then no requirement to nest with old fleets but old fleets will be replaced by a superior system. This potentially serves as an enormous booster for the first opportunity and also is a business in its own right.
Final goal is a patent-protected, robust and highly cost-competitive technology for building automated stores where shoppers can pick items, load them on trolleys, get them automatically and instantly scanned and paid using the proposed smart trolley & gate system and then walk out of the store without having to queue at a checkout or take out their wallet.

There are first smart carts in the US market, such as Amazon Dash Cart or Caper AI. We propose our proven space-saving trolleys (8.1) as best possible platform for the implementation of smart trolleys. Standardised shortest nesting increments are beneficial not only for saving space and achieving volume production but also for implementing useful features of a smart trolley such as wireless charging, communication and power transfer between nested trolleys, recognition of trolley rental and return, or trolleys protecting each other in a stack. Shortest nesting increments are essential for cost-efficient, safe and clean housing and charging of smart cart stacks which are more valuable and at higher risk of damage than ordinary carts.
Furthermore, we propose implementing part of the item recognition and checkout technology on the gate as a much more robust and cost-saving solution compared to current smart carts.

8.3 Public transport systems

A third opportunity is the joint development and licensed production of a new kind of railroad electrification system, with the preliminary name “COCORA”, which stands for COntinuous COnductor RAil.

For decades, railway electrification has been dominated by two very different systems. While third rail electrification is used predominately in space-constrained, short-distance subway systems, overhead catenary systems are used on many different rail networks, such as trams, light rail, subways, regional and high-speed rail.

Third rail electrification is significantly cheaper in construction and operation, but speeds are limited to 100 mph due to mechanical and electrical constraints. Voltages are limited to 1.5 kV DC, increasing electrical losses and limiting train performance.

Overhead catenary systems allow for efficient high-voltage AC operation and very high speeds (up to 250 mph). One of the main disadvantages is the space requirement. Catenary poles increase the width of the right-of-way and the overhead wire requires significant clearances, partially due to electrical safety considerations. Compared to third rail, catenaries increase the tunnel diameter by 20-30%, resulting in significantly higher construction costs.

COCORA offers all the benefits of third-rail electrification without the usual drawbacks such as limited speeds, increased electrical losses, or electric hazards.

The new system consists of a solid conductor rail mounted on one side of the track and a non-electrified support rail on the other side of the track. Trains are equipped with one or more current collectors on each side. Similar to overhead catenary systems, the continuous support of the current collectors enables higher speeds. The surface of the conductor and support rail is situated on the same level as the surface of the running rails. Switches are bridged with specially designed transition devices.

Trains are equipped with dampened pantograph arms featuring low-resistance contact strips.
COCORA has many advantages over catenary and third rail systems:

1. Low construction costs and easy installation

   The conductor- and the supporting rail rest on the sleepers and are held in the correct position by a fastening device. Compared to overhead catenary systems, no drilling and wire-stringing are required.

2. Space-saving design

   Of all electrification options, COCORA has the smallest footprint, making it ideal for sections of track with limited available space. Tunnels equipped with COCORA have a 30-40 percent smaller diameter than tunnels equipped with overhead catenary.

3. Safety

   COCORA offers sturdy protection covers, which help to minimise the risk of a flashover.

4. High Speeds

   The continuous support of the current collectors allows speeds just as high as with overhead lines.

5. Increased voltages

   The possible voltage is twice that of a conventional third rail system (3 kV DC), thanks to improved flashover protection and the use of low-resistance conductor rails (similar in design to solid overhead conductor rails). This design decreases electrical losses and doubles the possible energy throughput, making it suitable for high-demand systems and high-speed rail.

6. Less maintenance

   COCORA's design is as sturdy and low-maintenance as conventional third rail systems. The continuous support of the current collector enables low contact pressure and thus results in less wear on both sides.

7. Easy maintenance

   Disassembly and reassembly for maintenance are as easy as with third rail systems.

In North America, the use of double-stack container trains complicates the implementation and increases the cost of overhead catenary systems. Freight railroads are generally opposed to overhead electrification as it is not needed for freight operation and for the fear of electrical interference. Traditional third rail technology is not suitable for high-demand, higher-speed regional rail. With COCORA, commuter railroads across the US, Canada, and Mexico gain the opportunity to upgrade their rail lines to high-capacity, high-frequency and high-speed service while maintaining freight-rail compatibility and without the need to widen clearances.

Across the US, commuter railroads are looking at ways to electrify their network. Particularly in Southern California, Metrolink, Coaster, and Amtrak could massively benefit from electrification, as the frequency of rail service is high and ridership continues to grow.

Based on COCORA, a new, optimised trainset is proposed with a special shape to best use the available space in circular, bored tunnels. Together with these specially designed trainsets, new underground rail lines using COCORA will boast 30-40% lower construction costs compared to conventional metro systems, while offering much higher speed and the built-in possibility of faster skip-stop trains. Stations are situated within the tunnel and station access can be realised with circular, machine-bored shafts. Overall, the impact of construction would be minimal compared to traditional urban rail transit.

For the price of light rail, US cities can build highly attractive, ultra-fast rail lines without disturbing daily life.

COCORA is a fully worked-out concept ready to be translated into technical specifications and prototyping. Thanks to its uncomplicated design and the extensive use of readily available components, the steps needed for market entry and mass production are not capital-intensive. Bringing the system to market, which is the ultimate goal, would require at least one investor and possibly technology partners, preferably located in the United States.

Auxiliary material

1. US patent documents (trolleys, smart trolleys)

US 8,544,858 - corresponding to WO2011/127880 A1
https://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PTXT&s1=8544858.PN.&OS=PN/8544858&RS=PN/8544858

US 8,985,597 - corresponding to WO2012/034556 A1
https://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PTXT&s1=8985597.PN.&OS=PN/8985597&RS=PN/8985597

US 9,120,497 - corresponding to WO2012/119592 A1
https://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PTXT&s1=9120497.PN.&OS=PN/9120497&RS=PN/9120497

US 9,550,509 - corresponding to WO2014/183737 A1
https://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PTXT&s1=9550509.PN.&OS=PN/9550509&RS=PN/9550509

US 10,479,387 - corresponding to WO2017/152893 A1
https://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PTXT&s1=10479387.PN.&OS=PN/10479387&RS=PN/10479387

US Application 16/641,916 - corresponding to WO2019/042489 A1
https://appft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PG01&s1=16641916&OS=16641916&RS=16641916

US Application 16/965,277 - corresponding to WO2019/154449 A1
https://appft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PG01&s1=16965277&OS=16965277&RS=16965277

US Application 17/046,749 - corresponding to WO2019/166038 A1
(not searchable yet in the USPTO database)
https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2019166038&_cid=P20-KOQZZP-36804-1

2. German patent document (public transport systems)

DE 10 2020 000076 B3
https://patentscope.wipo.int/search/en/detail.jsf?docId=DE313869221&_cid=P11-KOR5F3-25767-1

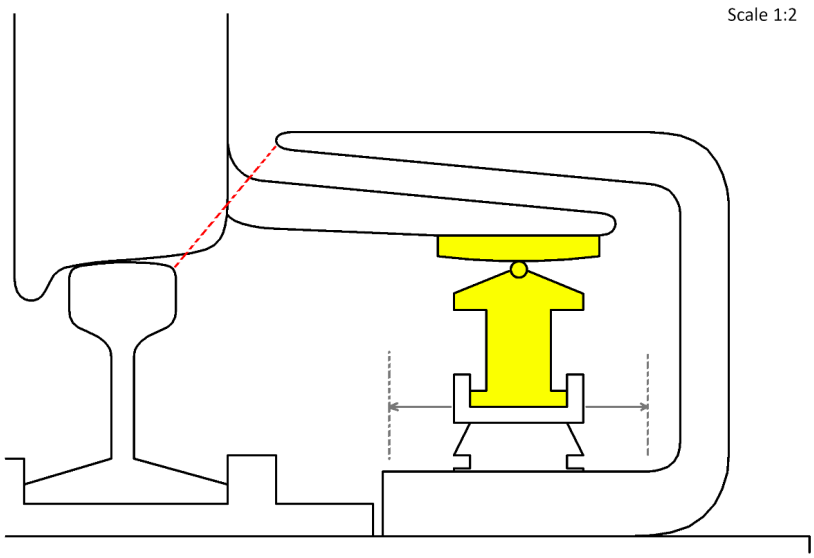
3. An impression of the trolley production

Kifato MK shopping cart production 2016
https://youtu.be/u7I0CHiOfPQ

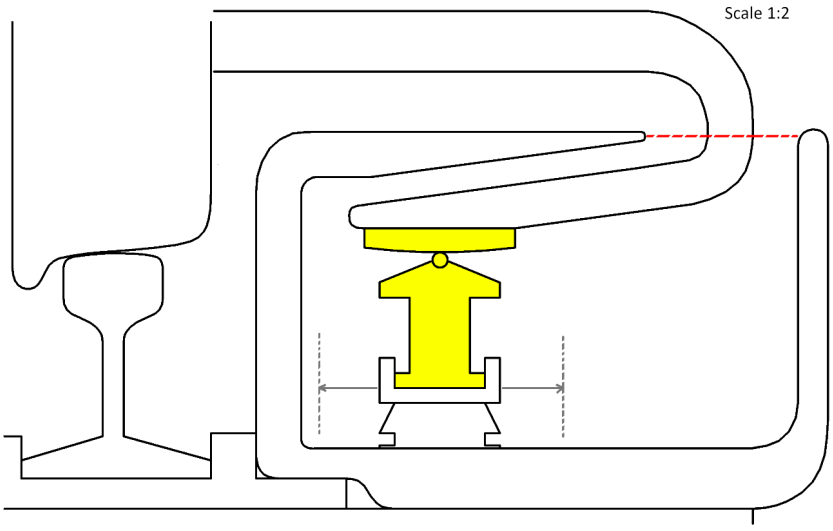
4. Examples of space-saving trolley designs having, according to US patent 8,544,858, a first 126mm nesting increment in transportation and a second 187mm nesting increment in use.

Commonly, around 680-700 pieces can be loaded in a 40ft container in four rows and on two levels, in case of the smallest trolleys around 1100 pieces.

4. Details of the COCORA system and the innovative trainset

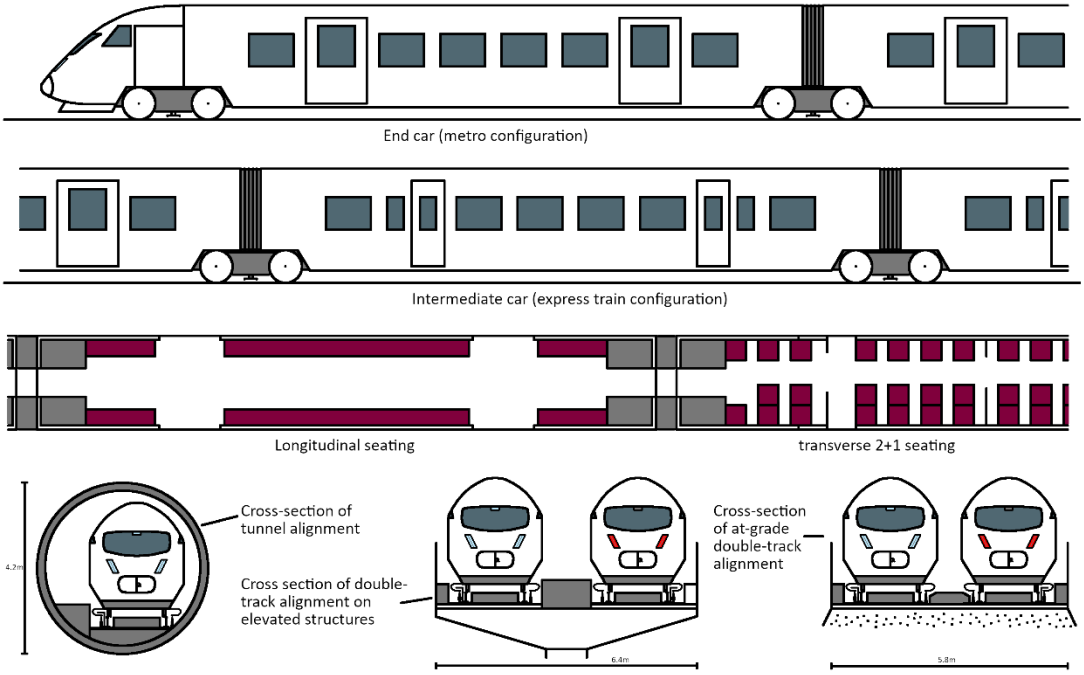


Version 1

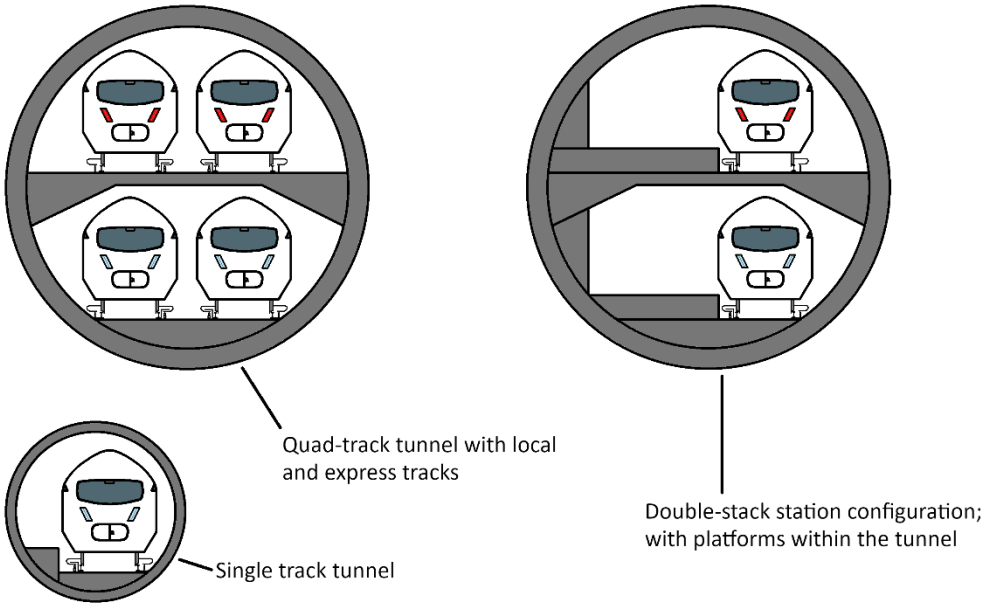


Version 2

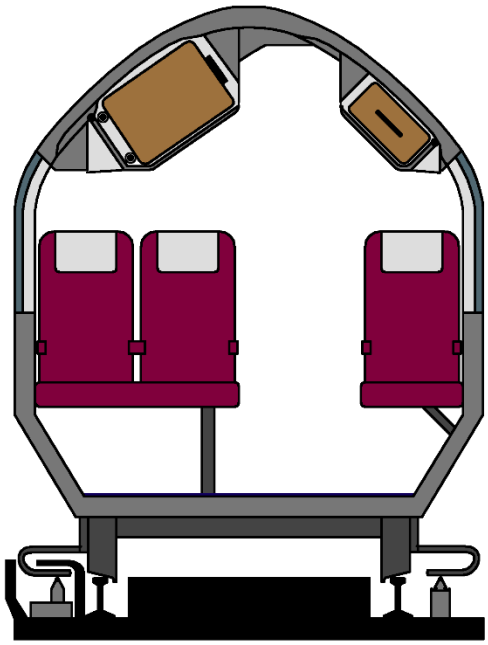
COCORA-based trainset



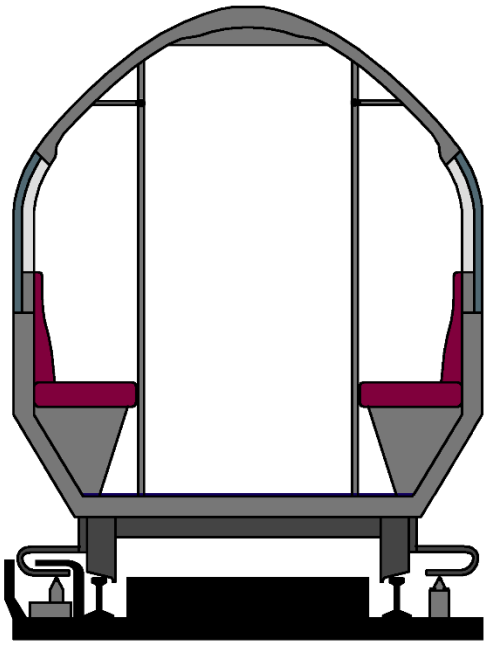
COCORA-based transit system - tunnel configurations



Interior Configurations



Express train configuration



Metro configuration

Contact:

1. Trolleys, Smart trolleys, Smart gates

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