Why do we need LeviCar?

The current transportation system for people and goods is complicated, labor-intensive, and often dangerous.

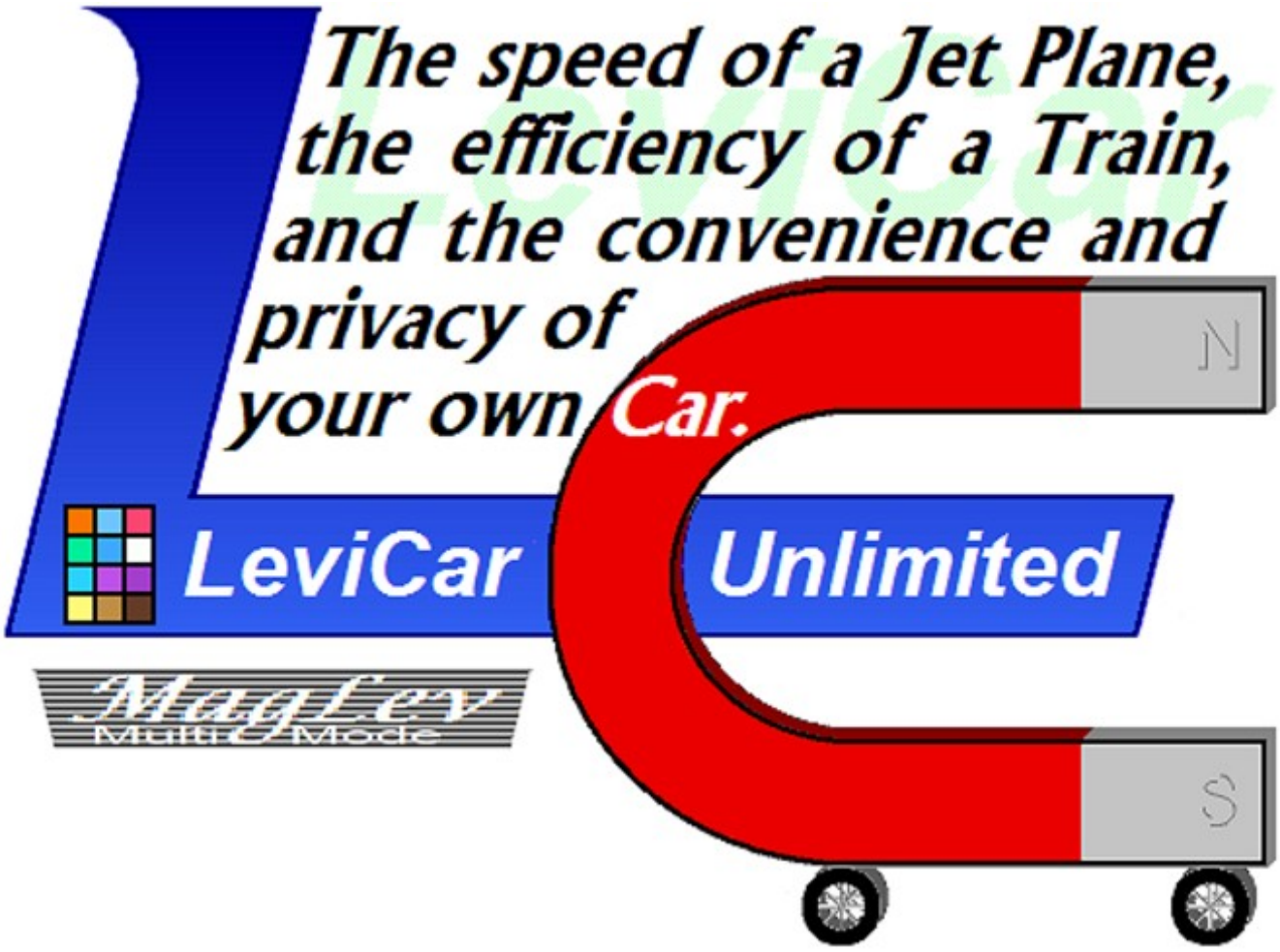
Mass-transit systems, from buses to airlines, very often require people to go from one vehicle to another several times in a trip. This lengthens the door-to-door travel time.

Individual automobiles can go directly door-to-door, but rely on human operators who are far from perfect, and tend to get fatigued on long trips. Cars also tend to be energy-inefficient. There is a high death rate for road travel, that people seem to tolerate.

For freight, railroads are good for heavy freight, where long unit trains of coal or other bulk goods can creep along at 14 mph. For medium- and light-freight, railroads are too inflexible to meet the needs of shippers, who opt for trucks and airplanes.

RoboTrail and LeviCar are designed to replace a good deal of our transportation infrastructure with a system that is flexible, fuel-efficient, and easy to use.

Unfortunately, “conventional” MagLev rail systems still use trains, and therefore take all the advantages of MagLev, and strangle them with all the limitations of trains. Remember, if the train goes where you're not going, when you're not there, it is less of a convenience to you. RoboTrail and LeviCar liberate “railroad” from “train”.



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Major Components of the RoboTrail / LeviCar Systems

Magnetic-Levitation (MagLev) Rail Network

Superconducting MagLev rails using the Danby-Powell Architecture, using repelling magnets, and allowing non-mechanical instantaneous switching between rails.

RoboTrail

A MagLev system for medium- and light- freight.

LeviCar

A MagLev system for passenger vehicles.

Stations

Places from which vehicles can enter the MagLev Rail Network on a kind of on-ramp, or leave the Network on a kind of off-ramp. Also, these are where vehicles can swap their MagLev bogies for road chassis (for LeviCars), or where the RoboTrail freight containers can be offloaded from truck trailers to the MagLev bogies, or vice versa.

Axle Sets

A LeviCar's detachable chassis consists of two axle sets or undercarriages, each containing an adjustable axle, two wheels each with an electric hub motor, electric-power-storage mechanisms, and other equipment.

Structure of LeviCars

Each LeviCar consists of a streamlined body, which sits on two detachable axle sets. The body holds the passengers and their luggage, for the entire duration of each trip, excepting rest stops.

Each axle set has an adjustable axle with two wheels, each with an in-wheel electric motor, and braking and suspension components. The axle set also contains steering/alignment mechanisms, electric batteries and/or ultra-capacitors, and possibly control mechanisms, computers, communications equipment, and heating/cooling.

The front axle set would probably be specialized for control, and contain any computers, navigation and communication systems, and control the steering. Wheel alignment would be automatic.

The rear axle set would probably be specialized for “strength”, containing the bulk of the electric-power-storage capacity, and perhaps the heating and colling systems.

LeviCar bodies and axle sets would also have mechanisms to facilitate attaching and removing axle sets to and from the car bodies at home, probably in the form of small “third wheels”.

Structure of RoboTrail

RoboTrail uses streamlined containers to hold freight. These are mounted on MagLev bogies on the MagLev rail network, but are hauled locally (between the source factory or warehouse and the source station, and later between the destination station and the destination store or warehouse) on flatbed trailers hauled by conventional truck tractors.

The Danby-Powell System

This a the first superconducting MagLev rail system, developed on Long Island many years ago by Drs. James Danby and Gordon Powell.

Most MagLev trains use mutually-attracting magnetic fields, so that part of each car must wrap around underneath the rail to attract the rail from below. This means that switching from one rail to another can only be done by mechanically moving the rails.

In contrast, the Danby-Powell architecture uses mutually-repelling magnetic fields, so that the vehicle sits atop the rail, with side pieces that do not go underneath the rail. It is possible to switch between using an all-electro-magnetic system of virtual rails, with no moving parts. This permits individually-targeted vehicles to freely switch between rails to get to each one's destination in an optimal fashion.

In normal operation, vehicles travel on a monorail to provide guidance and stability. For switching, the monorail “disappears”, and the vehicle travels on two “virtual” rails.

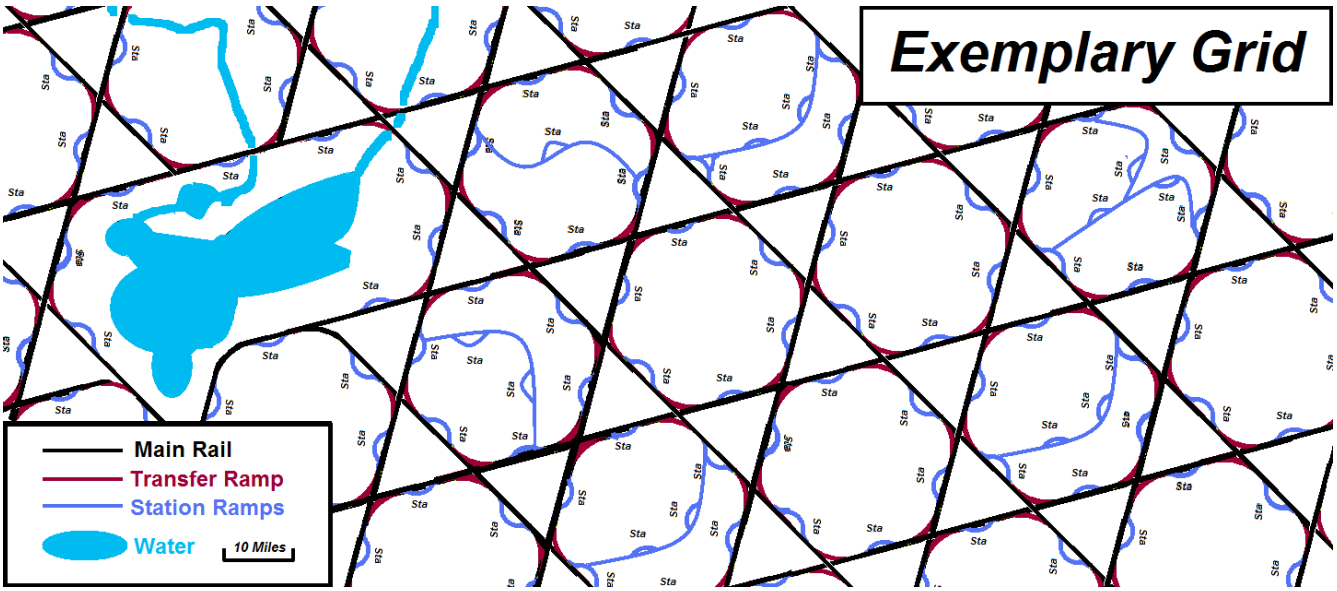
Geographic Rail Structures

Ideally, LeviCar stations, and RoboTrail stations, would be located no more than ten miles, by road, from any point in a populated area. This would be twenty miles in rural areas, and much more in wilderness areas. To minimize environmental impact, the rails would be elevated in both urban and rural areas, but stations would be at grade level.

This suggests a hexagonal grid. One set of rails would run parallel to each other, say 18 miles apart. Another set would be aligned to the first set with an angle of 60°, and the third set would aligned with the second set with an angle of an additional 60°. There would be curved section of rail connecting rails from one set to the other sets. These would be designed to minimize acceleration to 1.25g.

With proper scheduling algorithms, only single rails would be needed, although some places would have dual rails – one for each direction.

Additional stations can be added within each hexagon for heavily populated areas, as shown in the semi-schematic map below:



Business Model

RoboTrail and LeviCar would be operated by a mixture of for-profit, non-profit, governmental, and academic organizations. They will be operated according the the principles of Responsible Capitalism, whereby a business provides a useful service to its customers, in a safe and responsible fashion, and thereby is entitled to make a reasonable profit. Responsible Capitalism provides for healthy competition between companies, without defamation, undercutting, and nickel-and-diming of customers.

RoboTrail and LeviCar aren't really inventions, but constitute a new industry. It is hoped that this new industry is structured right, from the start.

Manufacturers would make the infrastructure (rails and stations), the vehicle bodies, the bogies, and the axle sets. These might be old established companies (including automotive and aerospace companies), or brand-new companies, some of which might be quite small. You might see a lot of custom-designed cars on the road when LeviCar takes on.

Operating companies would own and operate the rails and stations, and charge appropriate fees to the users. Most of these would be companies that already own the rights-of-way to be used, such as railroads and turnpike authorities.

Leasing companies would own and maintain the axle sets, which would be leased to the customers. The lease would include all maintenance (except battery charging). When going on the MagLev rail, the customer leaves behind the axle sets, and then gets another pair of them, from the same leasing company. (The car bodies would probably be owned by the customers, but some might be leased.)

Business Model (continued)

This new industry would centered about a not-for-profit entity call the "LeviCar Foundation". It would have two main subsidiary foundations, the "LeviCar Institute", and the "LeviCar Consortium". The first two would be supported by mandatory ad-valorum fees from the industry.

The "LeviCar Institute" would educate the public about LeviCar, and lobby the government to provide a "favorable regulatory environment". These regulations would not be to maximize profits to the many LeviCar companies, but rather (according to the principles of Responsible Capitalism) allow them to serve the public with safe and speedy transportation at a reasonable cost. There will be preplanned levels of deregulation as the industry matures, so that there are no surprises for those making long-range business plans.

The "LeviCar Consortium" will control many of the basic patents needed for RoboTrail and LeviCar, and will also maintain its own system for applying for new patents. By using web technology similar to blogs, it will enable inventors to submit ideas into a database. It will then consolidate similar ideas into patents, each with many inventors. The inventors, and their employers at the time the ideas were submitted, will each have a small share in the royalties from each patent. The inventors are saved the trouble of patent fees, and the possibility they may waste money trying to patent something that someone else thought of first. This is at the cost of reduced royalties.

Many patents clearly belonging to a particular company can be cross-licensed through the LeviCar Consortium, and there may be small regional "Patent Holding Companies" (associated with small companies within a locality) and "Patent Holding Foundations" (usually associated with universities).

What Will it Be Like to Live in a Levicar World?

The overall cost of operating automobiles will be less.

Car bodies will last a lot longer, maybe 40 years, saving us the ecological impact of melting down and remaking the car bodies. There would be a lot of individual designs, from many different small companies.

Individuals and families would own several car bodies, and would switch their axle sets between them. Each day, you can drive a car that is right-sized for that day's tasks.

Using a LeviCar-based Self-Propelled Trailer can mean that you can haul a heavy boat or camper using the smallest of manned road vehicles.

In recent years, big SUVs and pickup trucks have been status symbols. In the future, a sleek, fast, LeviCar will be a status symbol. Performance freaks will be gratified that electric drive can produce very fast acceleration.

Family vacations would be a lot easier on both parents and kids, since you would use the same vehicle door-to-door. Road-warrior consultants (if there still are any in the future) would also have it easier.

There would be a major decrease in air travel, because most overland trips will be on the MagLev network. This means less use of fuel, less pollution, less greenhouse-gas emissions, and fewer contrails.

LeviCar will benefit the economy, families, the environment, and our own national security be helping with energy independence. It is a win-win for the United States and for the World.