White Paper on Switchless Rail System

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Abstract

This paper discloses an invention in rail technology that allows a vehicle traveling on rails to change routes at a junction using static tracks. Conventional rail vehicles are switched by moving switches in the tracks. The vehicle chooses to go left, right, or straight ahead at a junction using lateral force, while the tracks underneath remain stationary. The advantages of standard rails over roads include less real estate used for a rail relative to a road, lower cost of construction, lower rolling resistance allowing much better fuel economy, greater load carrying capability, and longer service life expectancy. The huge advantage of a road system over a rail system is that a vehicle can go wherever it wants, where there is a road. This invention preserves the advantages of rails over highways, while retaining the route flexibilities of highways.

Discussion

A railroad switch (US) turnout, or a set of points (EUROPE) is a mechanical installation enabling railway trains to be guided from one track to another, such as at a railway junction or where a spur or siding branches off. Figure 1 is a picture of a switch. The tracks must be mechanically moved by an actuator, situated on the right in the photograph, to change directions.

Figure 1. A switch is moved to cause a conventional train to change tracks. Picture of switch is from Wikipedia®

Figure 2 is a top view of a static switch. Vehicles approach the junction from the bottom and take the right track when a right lateral (sideways) force is applied. This is illustrated as an arrow on a red wheel

set. If a left force is applied, illustrated as an arrow on a green wheel set, the vehicle takes the left track. Vehicles coming from the top, either left or right, are funneled onto the bottom track without need for lateral force. The left or right lateral forces are applied only over a “decision distance” illustrated in the drawing.

Lateral force may be applied by numerous diverter methods, such as side rollers, magnetic attraction, inertial, skid steering, wheel steering, or even a horse responding to the commands “gee” or “haw” to change direction of pull.

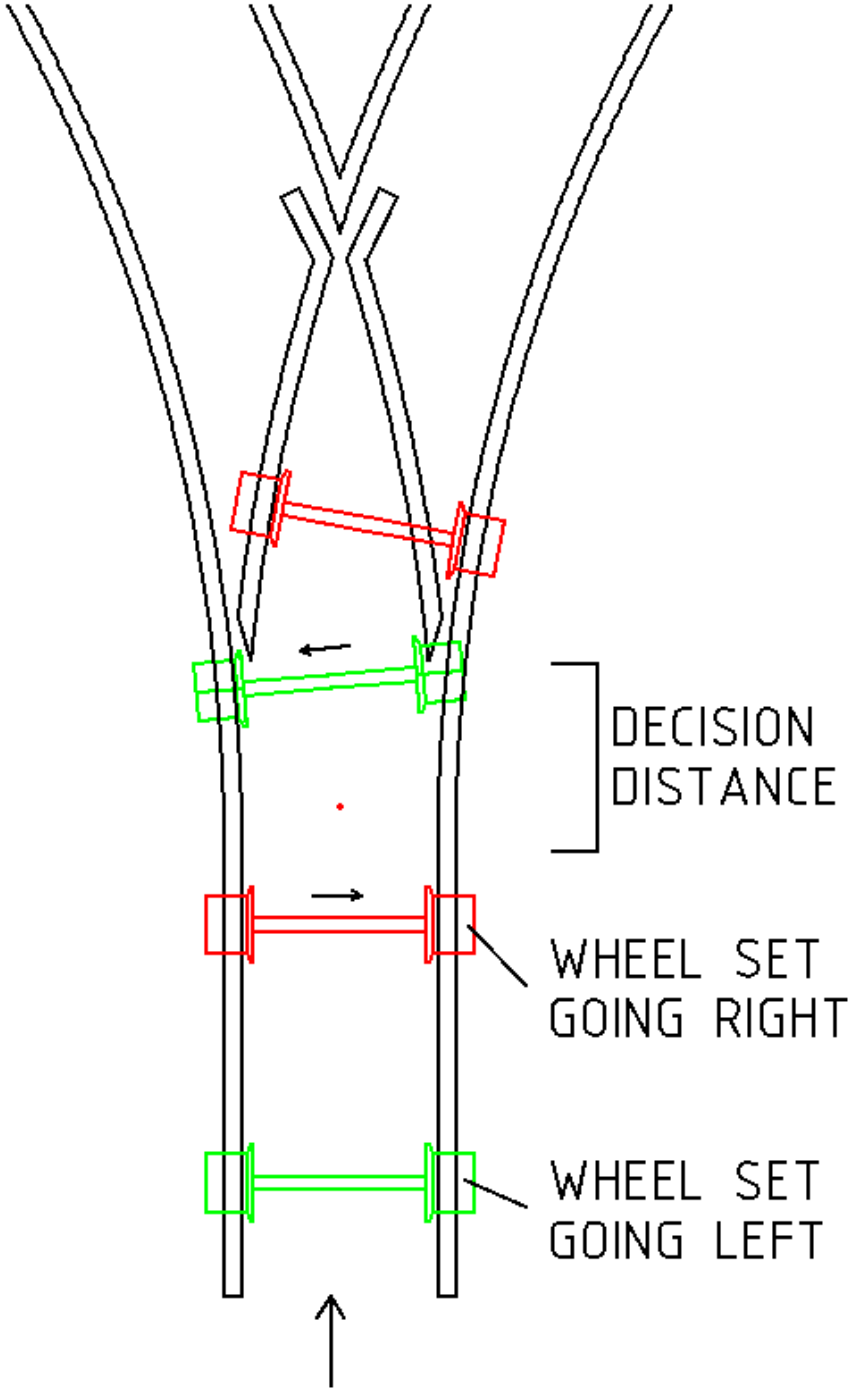

Figure 2. A junction illustrating a red rail wheel set going right and a green wheel set going left. Lateral force, shown as right and left arrows, determine which direction is taken by the wheel set at a junction. Force is applied over decision distance. There are multiple ways to apply lateral force.

Figure 3 is a model vehicle traveling on a static track.

Figure 4 is a picture of a model vehicle with its cover removed to show components.

Applications

Basically, all rail application are potential candidates for this invention. This invention is seen as complimentary to conventional railroads and tracks, not as a replacement. It is another use for existing tracks, most of which spend a large percentage of a day unloaded. When the vehicle's diverters are disengaged (e.g. raised) the vehicle can behave like a normal rail vehicle and operate on conventional switched tracks. The use of a Traffic Control System (TCS) allows safer, faster, and fuller utilization of a rail system. TCS capabilities include rides on demand, mass transit, collision avoidance, forming trains from individual vehicles to reduce air drag, automatic speed control, autonomous operation, and adaptive route selection.

Other applications include warehouses, mines, resorts and theme park transit, toys, switching yards, and cog railroads. Lines on light rail systems can be linked, allowing greater route flexibility and less train switching by passengers

Unconventional applications also arise, such as mobile home trailer parks, with rails instead of roads. Another application is water delivery/sewage removal for homes in mountains. In windy locations, the vehicles can be fitted with sails for propulsion.

Junctions have been designed that mechanically accommodate both rail-switched trains and autonomous vehicles.

Conductive tracks can provide powering or a neutral return, and a goal is to use renewable energy storage, assisted by battery power.

This system also makes an entertaining toy, particularly when computer control is used.

Comparable Systems

On the web search "Urban Loop Project Nancy France". You should come up with a French system being developed using a different type of track, but with similar and comparable objectives and features.

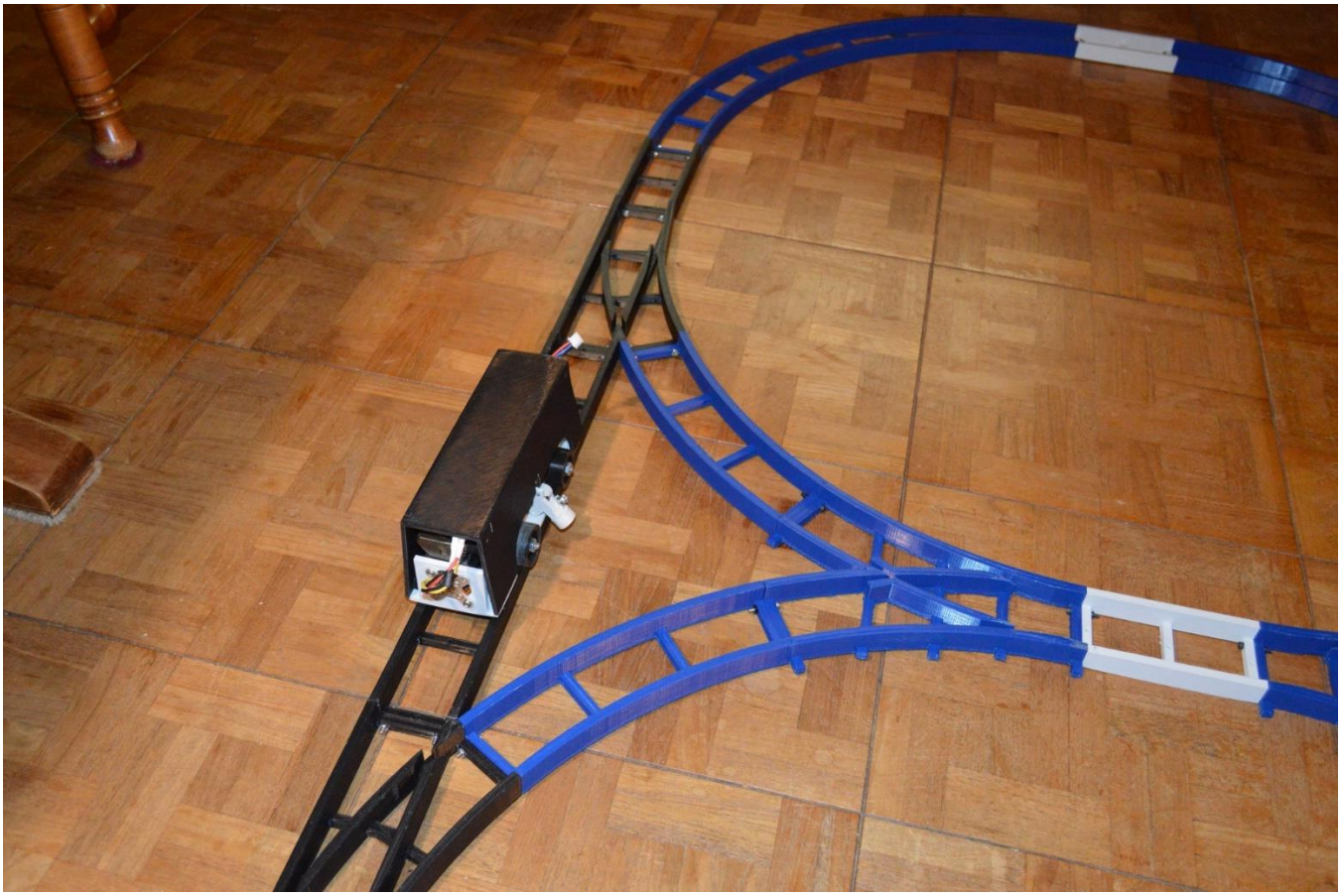

Figure 3. Model train on switchless tracks. Both vehicle and tracks were 3-D printed. The vehicle is made from PLA filament for precision. The tracks are made from ABS filament for strength.

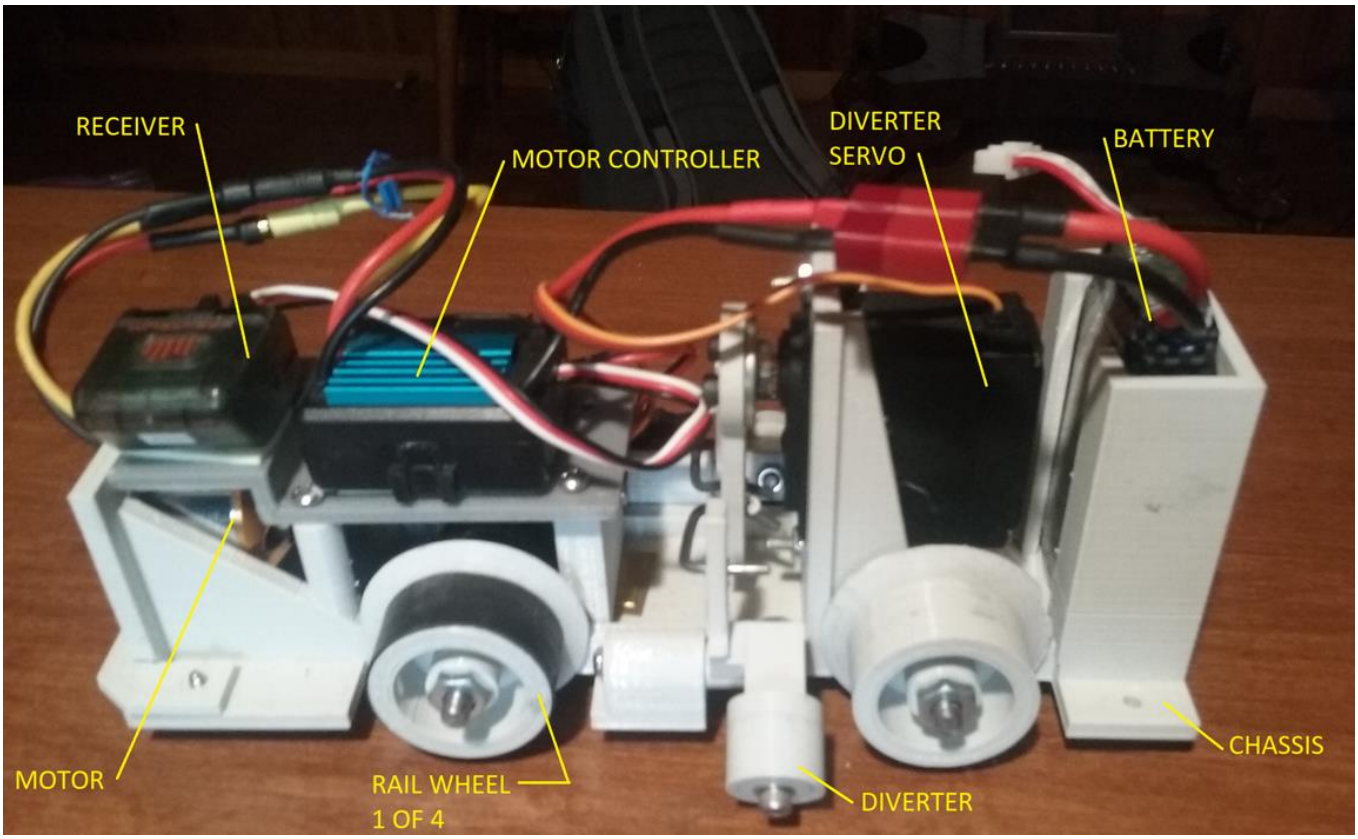

Figure 4. Side view of a model rail vehicle showing components. Not illustrated is worm gear transmission under motor controller.

Conclusion

This paper describes a new idea of rail systems using static rails. The invention is designed to bring route flexibility to rails, allowing efficient rail transport to gain an advantage over flexible but inefficient highway transport. Patents pending.

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