Downtown Mobility:

Getting Anyone Anywhere at Anytime, Cheaply and Safely.

DOWNTOWN MOBILITY.

Downtowns host a wide variety of uses and activities. Access is all about mobility; mobility thrives on multiple modes of travel. The goal of the system is to enable anyone to safely and cheaply get anywhere at any time. Multi-modal systems planning is required for the general population, the elderly, the young, the impaired and the impoverished.

The rapid multiplication of travel options in a downtown setting is overwhelming. The system of almost every downtown of any size must accommodate a growing variety of motorized and non-motorized modes of travel. It is hard to be inclusive when new and adaptive modes are rapidly emerging.

- **Motor powered vehicles** include personal vehicles, delivery trucks of all sizes, rail transit, regular and bus-rapid transit [BRT], scooters, robots and one-wheel electric scooter/skateboards.
- **Non-motorized travelers** walk, run or use recreation and commuter bicycles, delivery bicycles, non-motorized skateboards and scooters. Bikes need protected paths, storage spaces and accommodations on buses and trains. Technology-driven pedestrian crosswalks increase the comfort and safety of human walkers and runners, healthy and infirmed, along with features that enable robot delivery vehicles.
- **Autonomous and electric vehicles** of all types are changing the systemic features of every downtown mobility system.
- **Ridesharing** vehicles and bicycles add another dimension to downtown's mobility system.

MULTI-MODAL SYSTEMS PLANNING.

Multi-modal transportation planning for urban mobility demands thinking in systems. Taking advantage of new modes, new technologies and new combinations of the old and new is the opportunity now presented to every downtown. Envisioning a truly accessible community of active uses in an urban setting requires a sophisticated thought process; not just to capture the basic concept, but to drive the second or third level of detail to understand how the many layers fit together.

AUTONOMOUS VEHICLES.

Self-driving vehicles are being tested around America in the form of personal vehicles, delivery vehicles, over-the-road trucks and ride-sharing services like Uber and Lyft. Robots are delivering foods and goods using the sidewalks. The public infrastructure response to AVs will be needed sooner rather than later as AVs are poised for near-term deployment at scale.

ELECTRIC VEHICLES.

Electric vehicles may have a bigger impact on cities than autonomous vehicles. The abandonment of the internal combustion engine ends a hundred year run even though personal vehicles persist.

Charging stations may become a downtown amenity while they are a novelty. They will help reduce air pollution, noise pollution and the presence of convenience store gas stations.

The infrastructure response to AVs and EVs will be needed sooner rather than later as they are poised for near-term, large-scale deployment.

MODELS, SMART CITIES.

Columbus OH was selected by the U.S. Department of Transportation for the first Smart City grant. Kansas City and Pittsburgh are among the leading implementers. Cleveland's Health Line is the best BRT system in America. The other applicants developed thoughtful applications that reflect their current "smart" activities and their aspirations. Lots of smart thinking is going into downtown mobility systems that can be mined by others to select programs that fit their local situation.

> **Columbus [OH] will be the U.S. Department of Transportation's Smart City.** The city will receive $50 million in grant funding from the federal government and Vulcan Inc. to develop the city into a test track for intelligent transportation systems.http://www.dispatch.com/content/stories/local/2016/06/21/Columbus-Smart-City-grant.html

BUS RAPID TRANSIT.

Bus rapid transit [BRT] sounds like an oxymoron but it turns out to be a great compromise of regular bus service and fixed rail transit. BRT systems use exclusive lanes that eliminate the delays caused by cars and trucks in regular street lanes.

BRT systems use rubber-tired vehicles on surface streets, way cheaper than fixed rail transit. The key is exclusive lanes, nice coaches, stations that emulate train stations and on-time service. The new technologies [BRT w/AV] make all these features possible. The result will be mass transit that is more feasible to construct.

The Health Line on Euclid Avenue in Cleveland is the United States' best example; however, it is rated second class on the world stage.

Other countries have more advanced BRT systems. Nonetheless, other U.S. cities are at work to make BRT an important mode in their mobility systems…Eugene, Fort Collins and Kansas City [articles attached] are at the fore front.

BRT systems use preferred or pre-emptive traffic signal systems; the best of which is the pre-emptive system that changes the light when the BRT vehicle approaches the intersection. Pre-boarding payment, reliable schedules and nice coaches characterize BRT systems.

DOWNTOWN STOPS AND SHELTERS.

The downtown transit stops and shelters can be modernized and amenitized.

- **Regular Bus Service Stops.** Bus stops are located close together with few features.
- **Regular Bus Service Shelters.** Bus shelters have more substantial structures with real-time message boards, scheduled stops, structures for weather protection, sidewalk access and hard-surface pads that meet ADA requirements.
- **Multi-modal Stations.** BRT Stations are busy places with substantial structures that emulate train stations. They can have food and beverage services, rest rooms, ticket booths and waiting areas.

BRT Stations can provide access to regular bus service, BRT service and fixed rail services. BRT Stations are important civic assets, hopefully with sophisticated architectural designs.

BRT STATION FEATURES.

In addition to the basic features and facilities described above, BRT Stations can be more like train stations with:

- **Food and Beverage Leases.** Restaurants, cafés and food bars can provide service to the travelers and revenues to the system.
- **Pre-boarding pay stations** for those without smart phones and pre-paid passes.
- **Advertising.** Digital and traditional advertising can provide revenue to support the station operations.
- **Communication technology.** Stations can take advantage of high-technology tools to provide communication, information, education, public service announcements and entertainment to travelers through Wi-Fi, kiosks and stationary displays.

Like other innovations, the combination of new ideas is where dramatic change happens, such as the combination of BRT and AVs. The only real challenge to merging BRT with AV is whether transit service will itself become obsolete with the ubiquitous presence of individual ride-share AVs that, in essence, provide personalized transit in the place of "mass" transit.

BUS RAPID TRANSIT W/AUTONOMOUS VEHICLES [BRT/AV].

Ignoring this potential technological leap-frog, the idea described below anticipates a BRT/AV system. Thinking about the "all of the above" strategy, there will always be a need for mass transit due to street congestion in high intensity places, pollution and the cost to riders.

Two technologies are coming together to improve mobility in urban areas: BRT and AV – A natural combination of self-driving buses on fixed routes using exclusive travel lanes and pre-empted traffic signals. BRT has been tried in a few places but has not "gone viral".

The creative merging of BRT and AV technologies offer the prospect of better, safer transit service at a lower cost than fixed rail. The BRT advantages over fixed rail systems have long been debated as shown in the articles below; the most cogent comment says they are each best when used as complements. The advent of AVs makes BRT much more enticing.

A ONE-LANE BRT/AV SYSTEM.

One draw-back of traditional BRT systems is they require two dedicated lanes. A two lane system drives up costs, disrupts existing roadways and disturbs adjacent businesses. With modern technology, two lanes for the entire length of the route are not necessary.

With the computer timing of the BRT AV's movement, vehicles can be scheduled to only pass each other at stations, hence two lanes are only needed at the Stations. The rest of the dedicated route can have only one lane. Both on-coming vehicles arrive at the station at the same time and leave at the same time. Should one vehicle be delayed, the on-coming vehicle automatically remains in the Station until the delayed vehicle arrives.

With vehicles having doors on both sides, stations can be more strategically located.

THE ULTIMATE BRT/AV SYSTEM.

BRT in its full expression will consist of:

- **Stations:**
  - Strategically spaced stations,
  - That mimic rail transit stations with a full range of services, sophisticated architecture, food and beverage including fine dining and pleasant pedestrian access with
  - Pre-boarding fare payment.

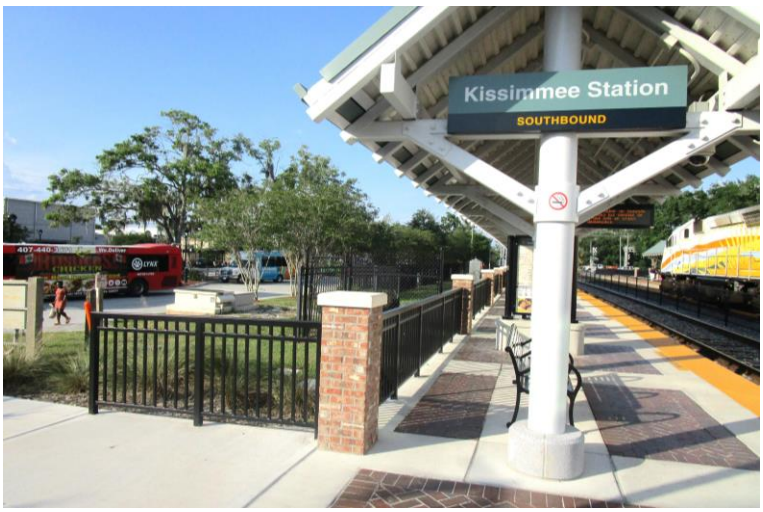
- **Vehicles:**
  - Smaller, high service, vehicles with 15 rather than 30 passengers, perhaps "connected" with
  - Comfortable seats, beverage service, Wi-Fi and other high-tech features.
- **Dedicated Lanes:**
  - One dedicated lane outside the Station areas enabled by Autonomous Vehicles controlled for safety and timing using a system of traffic signal preemption to control timing of traffic signals to maintain schedules and
  - Two lanes provided at Stations to enable the passing of vehicles, vehicles simultaneously arrive and depart stations with recalibrated timing.
  - All this coordinated passing of vehicles at precise points enabled by autonomous driver technology and traffic signal preemption,
  - Traffic signal "pre-emption", i.e., the light changes upon approach to keep the vehicle on schedule with
  - Frequent and reliable headways.
- Revenue Generating Sources:
  - Advertising,
  - Food and beverage leases,
  - Private transit access fees and
  - The fare box.

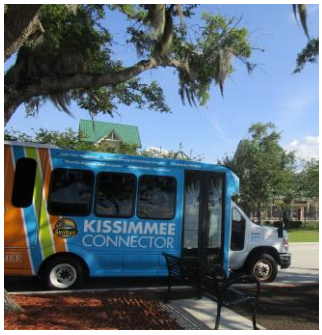
BRT w/AV should be coming to a downtown near you, soon.

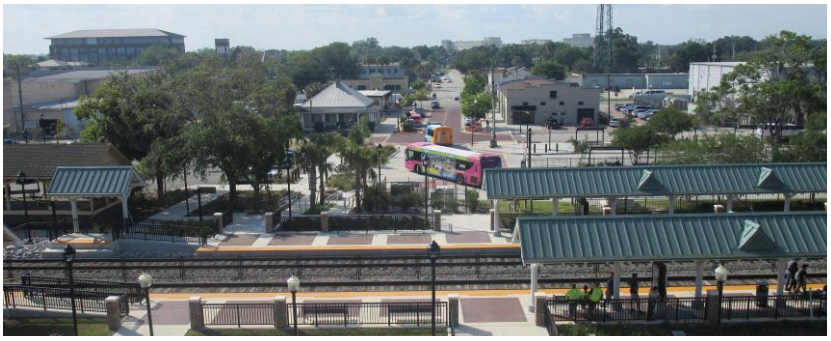
The Kissimmee Downtown Multi-modal Transportation Center

Travel Modes at Kissimmee's Multi-Modal Station

- Amtrak Regional Service
- Greyhound Bus Station
- SunRail Commuter Service
- Lynx Local Bus Service
- Kissimmee Connector, Downtown Shuttle
- Parking Deck
- Pick-up/Drop-off for taxis, rental cars, rideshare
- Bike Trail access







THE LITERATURE…attached articles:

KCMO

City Hall, 414 E. 12th St., Kansas City, MO 64106, 816-513-1313 (phone)

Kansas City Downtown Streetcar Project

For all things streetcar, including FAQ, route map, news and more, check out the dedicated KCStreetcar.org site! To read the history of the KC streetcar, visit our archive page.

KC Streetcar is open and free to ride!

Together with Mayor Sly James and the City of Kansas City, Missouri, the KC Streetcar Authority announced Friday, May 6, 2016, as the first day of public ridership on the KC Streetcar. Mayor Sly James said the grand opening of the KC Streetcar is more than a celebration of the end of construction. "This is the first step of what I believe will be a truly historic transformation of the entire city," James said. "Building owners and developers have completed, started or announced more than $1.6 billion in construction in the KC Streetcar district since the route was announced three years ago. I'm confident the entire city will find new momentum as the KC Streetcar energizes the heart of our community."

The KC Streetcar runs through the heart of downtown, connecting neighborhoods along the route: the River Market; the Central Business District; the Crossroads Arts District; and the Union Station and Crown Center area. There is no fee to ride the streetcar. The streetcar line features free Wi-Fi coverage from River Market to Union Station. Over 300 Wi-Fi transmitters provide coverage beyond the streetcar line.

Kansas City has more than two billion dollars in economic development underway within the boundaries of the KC Streetcar TDD, or Transportation Development District. As of May, 2017, this includes more than $2.1 billion in development projects completed, in progress or publicly announced since voters approved the streetcar in December 2012 This economic activity is the result of a combination of initiatives, demonstrating real growth in downtown Kansas City.

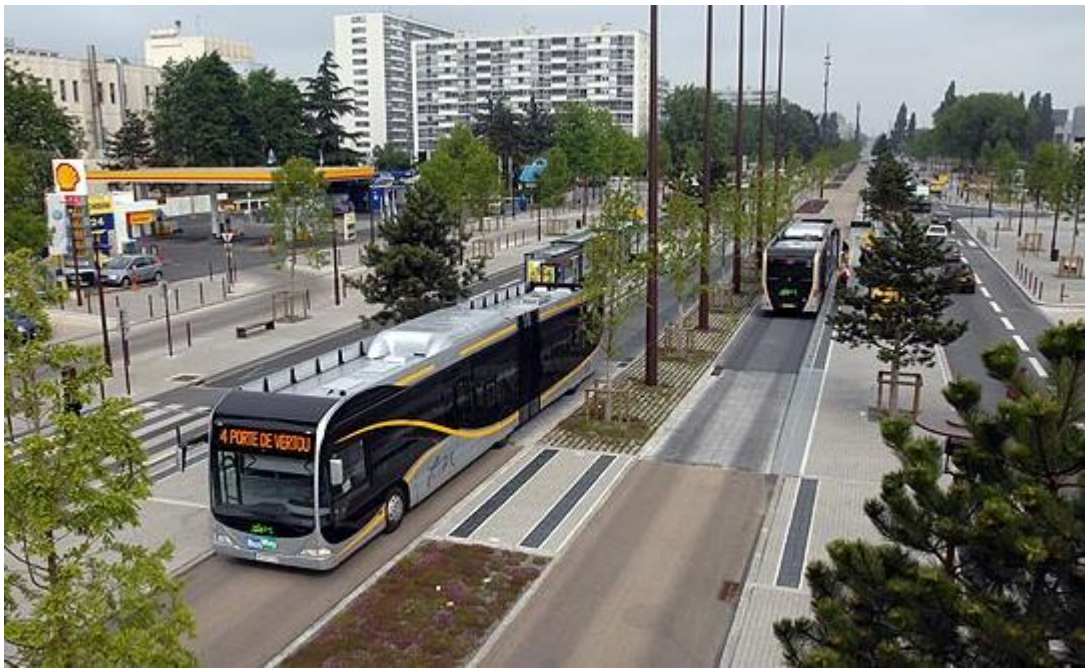
The chart also shows the subtotal of projects where the developer directly attributed the project and its location to the KC Streetcar. That amount is currently $381 million and focuses on projects right along the streetcar line, or within a block or two. View updated parking maps with parking lots and garages close to the streetcar line.

KC Streetcar Receives National Sustainability Award

Kansas City Public Works and the Streetcar Authority have been recognized by a national institute for their trailblazing sustainability practices. The Institute for Sustainable Infrastructure awarded the Kansas City Streetcar Project the Envision Platinum award for sustainable infrastructure, which is the highest level of the Envision rating system.

The Silly Argument Over BRT and Rail

Yonah Freemark May 25th, 2011



As if operating in parallel, Toronto's *Globe and Mail* and *The Wall Street Journal* each published articles last week describing the merits of bus rapid transit, which each newspaper described as the future of urban transportation.

Both noted that BRT was cheaper to construct than rail lines. Each suggested that in an age of government pull backs and general skepticism over the value of public investment, BRT could offer substantial benefits to a transit system at a reasonable price. And each article concluded with a warning by rail proponents that buses wouldn't be able to attract people out of their cars.
This is a sensationalized opposition between two modes of transportation that should be thought of as complementary. There are advantages to improved bus service in some corridors, reasons to support rail in others.

What is clear is that for the majority of American cities — excluding only a few in the Northeast — buses will remain the predominant mode of public transit for most riders, even after major expansions in train networks planned for cities from Charlotte to Phoenix. So even cities that choose to invest in rail projects must also spend on the improvement of their bus lines.

Image above: BusWay in Nantes, France, from City of Nantes
READ MORE AT… https://www.thetransportpolitic.com/2011/05/25/the-silly-argument-over-brt-and-rail/_

Portland Transport

Five reasons why BRT may have advantages over rail

by EngineerScotty on August 22, 2012 in Bus Rapid Transit

Once more into the bus/rail breech, my friends.

In various comments and articles, I've enumerated various advantages that bus rapid transit has over equivalent-service rail in some circumstances; this post is simply a collection of these. It doesn't constitute an endorsement of bus over rail for any specific project or system, hence the word "may" in the title–that analysis needs to be done on a case-by-case basis. And this is a one-sided post; the corresponding advantages that rail has over bus are not listed. Not because they don't exist or are not important, but simply because I wanted to collect many of the good technical pro-bus arguments in one place. (I'm limiting myself to technical arguments for the most part; sociological or political arguments such as "trains cause gentrification" or "rail is just pork for developers" are not included).

A bit of terminology: This article refers to "Class A", "Class B", and "Class C" transitways, which refer to the isolation of the transitway from other traffic. Very roughly:

- Class A is a grade-separated transitway (or one with absolute crossing priority), such as the various freeway-adjacent sections of MAX, and much of the Blue Line between Beaverton and Hillsboro. There are no examples of class A bus in the Pacific Northwest; North American examples can be found in Ottawa and Pittsburgh.
- Class B is surface operation in an exclusive right of way where the transit vehicle may need to stop at crossings, such as MAX through downtown, along Interstate and Burnside, and in downtown Hillsboro. Much of the EmX line in Eugene is an example of Class B BRT.
- Class C is ordinary mixed traffic operation–such as the bulk of TriMet's bus operations as well as the Portland Streetcar. Generally, plain class C bus is not considered BRT, but a type of bus service that is commonly referred to as class C+ bus (or by other names such as "rapid bus")–this refers to mixed traffic bus that enjoys enough enhancements (off-board fare collection, all-door boarding, signal priority, limited stop spacing, prominent stops) that it is a materially better product than local bus. Mixed-traffic streetcar systems can also have signal priority (and be class C+); the Portland Streetcar does not do this however.

A claim was made in a thread at Human Transit that for class A and B operation, rail is almost always preferable; this is a partial rebuttal to that, but the content is important enough to emphasize that it deserves a post of its own. **The reasons** BRT enjoys these advantages over rail: **Topology advantages**; **Partial operation**; **Costs**; **Less prone to catastrophic failure**; **The ability to pass**.

Quora

What are the advantages of light rail systems over bus-type mass transport (riding in dedicated lanes)?

Ian Straus, Marketing researcher for VIA Metropolitan Transit.
7 Questions Answered Dec 12, 2016

One [1] advantage seems to be that people like light rail more. It [2] gives a better ride, and it has [3] higher-status associations than buses do. So it is better at attracting people who have a choice of transportation: That means it attracts the whole population. So it contributes more to making the city an efficient place to live.

Light rail [4] also involves bigger vehicles and so moves more people with one operator. That matters a lot because the biggest part of the cost of running public transportation is the operators, not fuel. Yes BRT is often run with articulated buses but artics [articulated buses] are still shorter and narrower than a LRV [light rail vehicles]. Naturally this only matters when you run it in a corridor with enough demand to fill more seats than a BRT vehicle has. But all else equal the light rail will get more ridership in the same corridor.

Now note that both these modes perform better when they have dedicated rights of way. Whether it's a regular bus, a BRT bus, a streetcar, or light rail, if it's in traffic with a thousand cars it will be subject to traffic delays. But if it has its own right of way it can go at its own speed. True, intelligent control of traffic lights can speed things up a bit but no matter how intelligent there still have to be red lights and fools will still cause wrecks. Dedicated right of way gets you past that. One drawback of BRT, in my opinion, is that it's easier for planners to rationalize running it in mixed traffic to bring the cost down.
Of course LRT has a higher capital cost than BRT. The vehicles cost more and it requires laying rails.

Usually utilities are moved when rails are laid so they are not under the tracks, which is expensive. But some of that extra expense is illusion because sooner or later water and sewer lines need to be repaired and replaced anyway, so the water utility gets a windfall, a free renovation, while all the cost goes onto the books of the transportation authority. If your water and sewer lines leak as much as in most old cities, that is really a wash from the citizens' point of view, because we bear the cost of digging up the old sewer lines when they leak, and then re-paving.

But light rail has a lower [5] lifetime operating cost per passenger mile, because of a better seat to operator ratio, because electric motors are more efficient and need repair less than diesel engines, because LRT vehicles are designed for a much longer lifetime than buses (50 years instead of 12 or 8 years), and because LRT generally uses regenerative braking.

Source: https://www.quora.com/What-are-the-advantages-of-light-rail-systems-over-bus-type-mass-transport-riding-in-dedicated-lanes

From the:

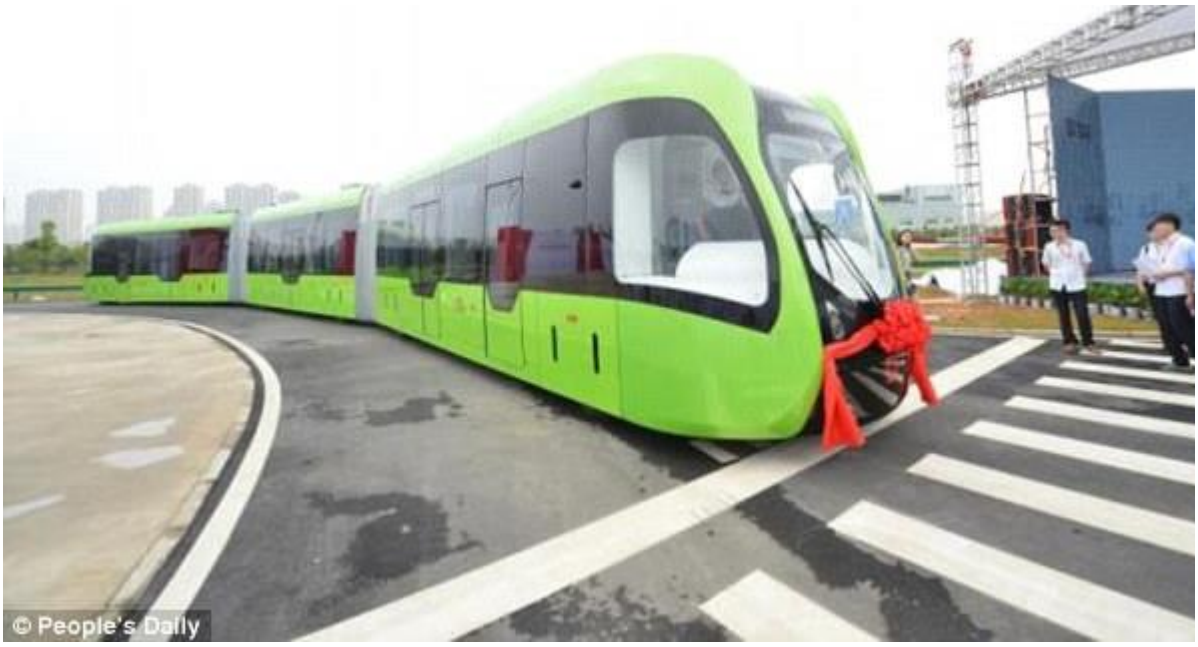
Daily Mail .com

Is this the future of urban transport? China unveils track-less train that runs on virtual railways

- **China has unveiled new non-polluting trains without tracks**
- **The vehicle runs on virtual rails and is said to begin operating in 2018 in Zhuzhou**
- **Car is just over 100 feet in length with a maximum passenger load of 307 people**

By SOPHIE WILLIAMS FOR MAILONLINE
PUBLISHED: 08:58 EST, 2 June 2017 | **UPDATED:** 09:04 EST, 2 June 2017

China has unveiled a track-less train that runs on virtual rails in a bid to speed up public transportation in major cities. The new trains were announced on June 2 in Zhuzhou, **China**'s Hunan province and are said to be non-polluting, reports the **People's Daily Online**. The Chinese rail corporation began designing the new system in 2013 and it is set to begin operating in 2018.



READ MORE AT...http://www.dailymail.co.uk/news/peoplesdaily/article-4565992/China-unveils-track-train-runs-virtual-rails.html